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CHINA'S MONOPOLY ON RARE EARTHS: IMPLICATIONS FOR U.S. FOREIGN AND SECURITY POLICY

HEARING

BEFORE THE

SUBCOMMITTEE ON ASIA AND THE PACIFIC

OF THE

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CONTENTS

Page

WITNESSES

Mr. Mark A. Smith, president and chief executive officer, Molycorp, Inc. 13
Mr. Robert Strahs, vice president and general manager, Arnold Magnetic Technologies, North America 25
Mr. John Galyen, president, Danfoss North America 31
Ms. Christine Parthemore, fellow, Center for a New American Security 40

LETTERS, STATEMENTS, ETC., SUBMITTED FOR THE HEARING

The Honorable Donald A. Manzullo, a Representative in Congress from the State of Illinois, and chairman, Subcommittee on Asia and the Pacific: Prepared statement 4
The Honorable Eni F.H. Faleomavaega, a Representative in Congress from American Samoa: Prepared statement 8
Mr. Mark A. Smith: Prepared statement 16
Mr. Robert Strahs: Prepared statement 28
Mr. John Galyen: Prepared statement 34
Ms. Christine Parthemore: Prepared statement 42

APPENDIX

Hearing notice 66
Hearing minutes 67
The Honorable Donald A. Manzullo: Statement by Grundfos 68
The Honorable Eni F.H. Faleomavaega: Material submitted for the record 70

CHINA'S MONOPOLY ON RARE EARTHS: IMPLICATIONS FOR U.S. FOREIGN AND SECURITY POLICY

WEDNESDAY, SEPTEMBER 21, 2011

House of Representatives,
Subcommittee on Asia and the Pacific,
Committee on Foreign Affairs,
Washington, DC.

The subcommittee met, pursuant to notice, at 1 o'clock p.m., in room 2172 Rayburn House Office Building, Hon. Donald A. Manzullo (chairman of the subcommittee) presiding.

Mr. MANZULLO. The Subcommittee on Asia and the Pacific will now come to order. We are waiting for Congressman Faleomavaega, so I will start with my opening statement.

In September 2010, the People's Republic of China shocked the world by halting critical rare earth mineral exports in retaliation to a territorial dispute with Japan in the East China Sea. The Chinese action sent a clear and unmistakable message to Japan and the rest of the world: China is willing to use economic tools to achieve diplomatic goals.

Two months later, when the export ban was lifted, the price of cerium soared from approximately $5 per kilogram before the ban to $67 per kilogram after the ban. The price of neodymium went from $42 per kilogram in April 2010 to $142 per kilogram 3 months after the ban. Then, the price of dysprosium nearly doubled from $250 per kilogram to $400 per kilogram in January 2011.

Today's hearing about rare earth minerals is both timely and important given the role that these elements play in America's manufacturing and defense industrial base. Rare earths are vital in a variety of manufactured goods, such as fluorescent lights, hybrid engines, wind turbines, cell phones, and neodymium iron boron permanent magnets used in defense systems.

China's actions against Japan fundamentally transformed the rare earths market for the worse. As a result, manufacturers can no longer expect a steady supply of these elements, and the pricing uncertainty created by this action threatens tens of thousands of American jobs.

For America's defense industry, a total reliance on China for rare earths represents a serious weakness for national security. China currently controls 97 percent of the world's rare earth production, including all stages of the supply chain for permanent magnets.

China's ability to dictate market terms to the rest of the world is particularly worrisome given its unwillingness to follow established international trade rules. To make matters worse, China is determined to retain much of the rare earth minerals it produces to meet growing domestic demand.

Thus, American manufacturers are locked into a no-win scenario where the world's sole supplier of rare earths is tightly controlling global supply. In fact, domestic Chinese demand is projected to consume nearly all the rare earth minerals that country produces, leaving nothing for export markets.

From the 1960s to the 1980s, the U.S. was the global leader in production, research, development, and fabrication of rare earth elements and magnets. During this period, however, Chinese leaders strategically targeted the rare earth industry for export to China. They succeeded. By using a combination of low labor cost and non-existent environmental standards, China gradually transferred the entire American rare earth industry overseas.

In 2002, the sole remaining American producer of neodymium iron boron magnets, Magnequench, located in Indiana, was sold to the Chinese with full approval from the Committee on Foreign Investment in the United States. That was the last act in the American tragedy.

Subsequent to that, I authored a change in the bill that provides whenever a state or an enterprise buys an American company of significance, that it has to be elevated to the highest level of vociferous review, as opposed to being done at the lowest level.

This is where we are today. This crucial American intellectual property was forever transferred to China. If it were not for entrepreneurs like Molycorp, we would never end our dependence on China for rare earths. That is why we are having this hearing today.

After China's 2-month rare earth mineral export embargo concluded in November 2010, the market price of certain rare earths, particularly cerium, neodymium, and dysprosium, soared to new highs. Currently, the prices of these elements are at astronomical levels, in some cases 650 percent over pre-export ban prices.

As a result of this unprecedented supply disruption, the Japanese manufacturing industry implemented efforts to stockpile rare earths and to begin development of alternative technologies.

In the U.S., however, there has been barely any awareness of the seriousness of this crisis. But, to their credit, the Department of Energy, under the ARPA–E program, is conducting cutting-edge research into rare earth alternatives. Unfortunately, the scope of this crisis is enormous and only a concerted national effort will lead us out of this mess.

The 16th District of Illinois, which I have the honor of representing, depends heavily on manufacturing for its livelihood. Manufacturing accounts for approximately 25 percent of the local economy or is double the national average. In fact, in just three counties comprising less than 300,000 people, we have exports in excess of $3.2 billion a year.

Manufacturers in Illinois and nationwide are extremely concerned about China's monopoly on rare earths, and we need to heed their urgent call to action. Thus, we call upon the administration to work with Congress to formulate a coherent, common sense approach to ending China's monopoly on rare earths.

It is not a Republican or a Democratic issue. It is an American issue that requires bipartisan leadership. I have met at length with industry representatives and officials from the Departments of Energy and State to try to gain a better understanding of the magnitude of this crisis.

I cosponsored legislation authored by Representative Mike Coffman of Colorado to streamline the process for domestic rare earth production, and I recently urged U.S. Trade Representative Ron Kirk to take action at the World Trade Organization against China's unfair export practices.

Before I recognize my good friend the ranking member for his opening statement, I want to acknowledge the presence of Chairman Jerry Lewis, who is the Member of Congress that represents Molycorp's mine in California. Chairman Lewis is here to introduce Mr. Smith.

I intend to recognize the ranking member for his opening statement, then allow Chairman Lewis to introduce Mr. Smith. I now recognize Ranking Member Eni Faleomavaega.

[The prepared statement of Mr. Manzullo follows:]

One Hundred Twelfth Congress
Congress of the United States
Committee on Foreign Affairs
Subcommittee on Asia and the Pacific

September 21, 2011

Confronting China's Rare Earths Monopoly: Implications for U.S. Foreign Policy

Chairman Donald A. Manzullo
Opening Statement

In September 2010, the People's Republic of China shocked the world by halting critical rare earth mineral exports in retaliation to a territorial dispute with Japan in the East China Sea. The Chinese action sent a clear and unmistakable message to Japan and the rest of the world: China is willing to use economic tools to achieve diplomatic goals. Two months later, when the export ban was lifted, price of cerium soared from approximately $5 per kilogram before the ban to $67 per kilogram after the ban. The price of neodymium went from $42 per kilo in April 2010 to $142 per kilo three months after the ban, and the price of dysprosium nearly doubled from $250 per kilo to $400 per kilo in January 2011.

Today's hearing about rare earth minerals is both timely and important given the vital role that these elements play in America's manufacturing and defense industrial base. Rare earths are vital in a variety of manufactured goods, such as fluorescent lights, hybrid engines, wind turbines, and neodymium iron boron permanent magnets used in defense systems. China's actions against Japan fundamentally transformed the rare earths market for the worse. As a result, manufacturers can no longer expect a steady supply of these elements, and the pricing uncertainty created by this action threatens tens of thousands of American jobs. For American's defense industry, a total reliance on China for rare earths represents a serious weakness for national security.

China currently controls 97 percent of the world's rare earth production, including all stages of the supply chain for permanent magnets. China's ability to dictate market terms to the rest of the world is particularly worrisome given its unwillingness to follow established international trade rules. To make matters worse, China is determined to retain much of the rare earth minerals it produces to meet growing domestic demand. Thus, American manufacturers are locked into a no-win scenario where the world's sole supplier of rare earths is tightly controlling global supply. In fact, domestic Chinese demand is projected to consume nearly all the rare earth it produces, leaving nothing for the export markets.

From the 1960s to the 1980s, the U.S. was the global leader in production, research and development, and fabrication of rare earth elements and magnets. During this period, however, Chinese leaders strategically targeted the rare earth industry for export to China. Well, they succeeded. By using a combination of low labor cost and non-existent environmental standards, China gradually transferred the entire American rare earth industry overseas. In 2002, the sole remaining American producer of neodymium iron boron magnets, Magnequench, located in Indiana, was sold to the Chinese with full approval from the Committee on Foreign Investment in the United States (CFIUS). This was the last act in the American tragedy; with the sale of Magnequench, crucial American intellectual property was forever transferred to China. This is where we are today, and if not for entrepreneurs like Molycorp, we would never end our dependence on China for rare earths. That's why we are holding this hearing.

After China's two month rare earth mineral export embargo concluded in November 2010, the market price of certain rare earths, particularly cerium, neodymium, and dysprosium, soared to new highs. Currently, the prices for these elements are at astronomical levels, in some cases 650 percent over pre-export ban prices. As a result of this unprecedented supply disruption, the Japanese manufacturing industry implemented efforts to stockpile rare earths and to begin development of alternative technologies. In the U.S., there is barely any awareness of the seriousness of the crisis; however, to their credit, the Department of Energy (ARPA-E) is conducting cutting edge research into rare earth alternatives. Unfortunately, the scope of the crisis is enormous and only a concerted national effort will lead us out of this mess.

The 16th Congressional District of Illinois, which I have the honor of representing, depends heavily on manufacturing for its livelihood. Manufacturing accounts for approximately 25 percent of the local economy or double the national average. Manufacturers in Illinois and nationwide are extremely concerned about China's monopoly on rare earths, and we need to heed their urgent call to action. Thus, I call on the Administration to work with Congress to formulate a coherent, common sense approach to ending China's monopoly on rare earths. This isn't a

Republican or a Democrat issue. It is an American issue that requires bipartisan leadership.

I have met at length with industry representatives and officials from the Departments of Energy and State to try to gain a better understanding of the magnitude of this crisis. I cosponsored legislation authored by Representative Mike Coffman of Colorado to streamline the process for domestic rare earth production, and I recently urged U.S. Trade Representative Ron Kirk to take action at the World Trade Organization against China's unfair export practices.

I thank the distinguished witnesses for appearing before the Subcommittee. I look forward to your testimonies.

Mr. FALEOMAVAEGA. Mr. Chairman thank you for calling this hearing. Like you, I would like to personally welcome our colleague before our subcommittee, my good friend Chairman Jerry Lewis, for being with us this afternoon.

As I say, Mr. Chairman, thank you for holding this hearing. Considering China has been operating in rare earths, it has implications not only for our security concerns but as well as our foreign policy issues.

Why do rare earth's elements matter? They matter because these elements are used in military systems we count on to protect us like anti-missile defense and space-based satellite and communications systems. These are used to power clean energy. They are used in medical devices, jet fighter engines, the automotive industry, colored television, and flat panel displays like cell phones, portable DVDs, laptops, et cetera, et cetera.

While the United States was once self-reliant and domestically producing REEs, over the past 15 years, we have become 100 percent reliant or dependent on imports, primarily from China, which currently controls 95 percent of the world's market of rare earth even though they only have 35 percent of the world's reserves.

Like many of my colleagues, I believe our dependence on China for REEs poses a risk to our national security as well as our economic well-being. Data from the U.S. Geological Survey estimated that in 2010 the added value to Gross Domestic Product by major industries that consume processed non-fuel mineral materials, including rare earths, was approximately $2.1 trillion, or 14 percent, of the total U.S. Gross Domestic Product. That is $14.6 trillion GDP, a considerable portion of our nation's economy.

Concerned by these developments and also many other potential for the U.S. and its territories, I introduced a bill, H.R. 2803, to recover non-fuel minerals from the shallow and deep oceans under the U.S. territorial jurisdiction throughout the Pacific. These deposits are known to include an abundant supply of rare earth minerals.

My proposal would require the U.S. Department of Interior's Bureau of Ocean Energy Management, Regulation and Enforcement in consultation with other appropriate agencies to conduct an assessment of the sea bed area around the U.S. continental shelf, including areas that are contiguous to and within the 200 miles EEZ of the United States and its possessions for non-fuel minerals.

Mr. Chairman, it is only a preliminary request, but the important step is that there should be a comprehensive effort to ensure that there is no risk to the supply of important minerals for domestic consumption.

I want to thank my colleague Chairman Lamborn of the Resources Subcommittee on Energy and Mineral Resources for holding a hearing on the bill, especially considering the value of refined rare earths imported by the United States last year alone was $161 million and that the Chinese Government recently placed restrictions on its supply of rare earths as reported in the New York Times article dated 16 September entitled "Chinese Consolidated Group on Rare Earths," which I ask to be included and be made part of the record, Mr. Chairman.

Mr. MANZULLO. Without objection.

Mr. FALEOMAVAEGA. And I do want to welcome our distinguished guests and experts on this very important issue. And I look forward to their testimony.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Faleomavaega follows:]

STATEMENT OF THE HONORABLE FALEOMAVAEGA BEFORE THE SUBCOMMITTEE ON ASIA AND THE PACIFIC REGARDING CHINA'S MONOPOLY ON RARE EARTH MINERALS

September 21, 2011

Mr. Chairman:

I thank you for holding this hearing about "China's monopoly on rare earths and its implications for U.S. Foreign and Security Policy."

Why do rare earth elements, or REEs, matter? They matter because these elements are used in military systems we count on to protect us – like antimissile defense and space-based satellite and communication systems. REEs are used to power clean energy. They are used in medical devices, jet fighter engines, the automotive industry, color television and flat panel displays like cell phones, portable DVDs, laptops, etc.

And while the United States was once self-reliant in domestically produced REEs, over the past 15 years we have become 100% reliant on imports, primarily from China. Like many of my colleagues, I believe our dependence on China for REEs poses a risk to our national security and economic well-being.

Data from the United States Geological Service (USGS) estimated that in 2010, the added value to Gross Domestic Product by major industries that consume processed nonfuel mineral materials, including rare earths, was $2.1 trillion (14%) of the total U.S. Gross Domestic Product (GDP) ($14.6 trillion) – a considerable portion of our nation's economy.[1]

Concerned by these developments and also knowing of the potential for the U.S. and its territories, I introduced H.R. 2803, for purposes of assessing how we might be able to recover nonfuel minerals from the shallow and deep bed of the United States since these deposits are known to include an abundant supply of rare earth minerals.

My proposal would require the U.S. Department of the Interior's Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE), in consultation with other appropriate agencies, to conduct an assessment of the seabed area around the U.S. continental shelf including areas that are contiguous to and within the 200 miles economic exclusive zones (EEZ) of the United States territories and possessions, for nonfuel minerals.

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[1] *"Mineral Commodity Summaries 2011"*, by the U.D. Department of the Interior & U.S. Geological Survey, approved for publication January 21, 2011

It is only a preliminary but important first step in what should be a comprehensive effort to ensure there is no risk to the supply of important minerals for domestic consumption, and I thank Chairman Doug Lamborn of the Natural Resources Subcommittee on Energy and Mineral Resources for holding a hearing last week on H.R. 2803, especially considering that the value of refined rare earths imported by the United States in 2010 was $161 million and that the Chinese government recently placed restrictions on its supply of rare earths as reported by the New York Times in an article dated September 16, 2011 and entitled, "China Consolidates Grip on Rare Earths" which I ask be included for the record.

I also ask that a chart from the USGS be included, and I thank you for your leadership on this important matter.

Mr. MANZULLO. Chairman Lewis, can you wait until Mr. Sherman gives his opening statement? Are you okay on time? Okay. Mr. Sherman?

Mr. SHERMAN. The fact that China has been operating this area is not an act of God. God in his wisdom put two-thirds of the rare earth elements outside China.

It is a result of Chinese unfair trade practices, not only the cheap labor and manages to the environmental standards that the chairman referred to but the fact that China subsidizes this industry under the table. And they could afford to do so because of their other unfair trade practices.

The underlying problem is that the most powerful interests of the United States benefit massively from Chinese unfair practices. They may not benefit from Chinese unfair practices with regard to rare earth elements but the overall relationship with China means you make it for pennies, sell it for dollars in the United States, ship the jobs overseas, and report high earnings per share. And Chinese control over rare earth elements gives them one more argument as to why we should kowtow to China. After all, they have got all the rare earth elements.

The solution is to end these practices by ending MFN for China 6 months after enactment, which is what a bill I have proposed would do, and force China to change all of its unfair policies under threat of a regime-challenging economic downturn.

Now, the most powerful and rich in our society are not going to allow us to seriously consider that. And the think tanks they fund will discourage it. They won't allow any fundamental change in our relationship with China. And they will constantly tell us that earnings per share is the same thing as national economic health.

In my district, there are four full-time cable television channels dedicated to the worship of Wall Street and earnings per share. There are only three channels dedicated to the worship of Jesus Christ.

So we will have a hearing on this unfair trade practice. We could have 999 other hearings on other unfair trade practices. We will file something with the WTO. It will be meaningless. We may be able to deal with this one issue by subsidizing the industry if we have any money left over for that or perhaps restricting Chinese exports, rare earth elements, which strikes me as unlikely.

It is time to tell China that MFN ends 6 months from today. Otherwise we are going to die from 1,000 unfair cuts. And we will have the opportunity to have 1,000 hearings on each one of them.

I yield back.

Mr. MANZULLO. Thank you.

Mr. Lewis, do you want to introduce your constituent?

Mr. LEWIS. Yes. Thank you very much, Mr. Chairman. I will be very brief. The members of the committee probably don't know this, but in my territory, San Bernadino County, there is enough desert space you can place easily four eastern states. And within that territory, there is many an opportunity as well as a resource. And it happens to be the location of America's very large deposits of rare earth elements.

It is very important for us to expand upon your already very able articulation about the importance of rare earth minerals and what they mean to the United States. It is significant I think for you to know that I met Mark Smith only recently when I traveled out to Mountain Pass, which is really out in the boondocks in my district, about 40 miles, 50 miles away from Las Vegas.

At that event, there were a couple of hundred employees of the United Steel Workers Union largely. And Mr. Smith, whom I will be introducing to you formally, had a presentation to make. And it was a very sizeable photograph of the president of the United Steel Workers along with Mr. Smith and one Harry Reid of beautiful downtown Nevada, all of whom have an interest in this subject area in no small part because most of those employees live across the line in Nevada, but also it is my understanding that many years ago, Harry Reid's father worked at this very location in Mountain Pass as one of the mining employees.

This resource is critical to our future. And China is deadly serious about having as much control as they possibly can over this resource, wherever it might exist. They have made significant efforts to try to get control, get their nose into the control of this resource and other elements that relate to it in the United States.

Australia has a very significant supply or location or rare earth minerals. China was going about attempting to capture influence and control of that resource. And the legislature in Australia stood in the way and prevented it, indicating at a very fundamental way the recognition of the importance of rare earth minerals in terms of future development that relate to horizon kinds of technologies, very important, as the chairman mentioned, the guidance systems for some of our missiles and used in elements that write very much to the effectiveness of some of our computer systems and the like, very, very critical.

Mark Smith didn't start out to be a mining engineer. He got his engineering degree from Colorado State University, where he had hoped to specialize in the field of agriculture, maybe building tractors for you at home, Don Manzullo.

But in the meantime, economies ebb and flow. And that took him directly to mining. And, with that, he has been associated with Unocal and Chevron for many, many years.

At one time, he was the president of Chevron's Mining Corporation, a solely owned corporation of Chevron. With that, eventually those interests were sold in the marketplace. And Molycorp became the holding base for these rare earth elements located at Mountain Pass.

Not so long ago, we recognized this growing need and the competition that exists in the marketplace. Molycorp went about to going public and, in no small part, going public in order to raise the capital necessary to expand the mining activities at Mountain Pass but also to be able to process those minerals in a fashion whereby they can be effectively and efficiently used in industry.

The project involves almost $800 million of investment at Mountain Pass, very important to our constituency, a lot more important to the country.

I have come today with absolutely no expertise in terms of the details of the way these minerals do apply themselves to our industry, but you and I share a great interest in the future of our security and the role that we play on behalf of freedom in the world.

So to have the likes of Mark Smith and the balance of the balances that I will shortly leave to join you at the rostrum is not just a privilege. They have been of great service to our country. It is very important that your committee be focusing the way they are upon these elements to our future security.

So thank you very much, Mr. Chairman. And let me introduce Mark Smith.

Mr. MANZULLO. Thank you. Mr. Chairman, would you like to have a seat up here? Without objection, we welcome you to our panel.

Today's witnesses represent three key components of the rare earth supply chain from mining to fabrication to manufacturing. Molycorp is at the forefront of bringing rare earth production back to the United States. Mr. Smith is chief executive officer of Molycorp. It is a real pleasure to welcome you to our subcommittee.

Arnold Magnetic Technologies is one of America's leading manufacturers of permanent magnets. Arnold is a key component of the rare earth supply chain. Magnets are indispensable in many of the products that we use today. I am delighted to represent one of Arnold's manufacturing facilities in Marengo, Illinois, which is part of the 16th Congressional District.

Mr. Robert Strahs is vice president and general manager of Arnold Magnetic. He currently manages their three facilities in Rochester, New York; Marengo, Illinois; and Ogallala, Nebraska. Previous to this role, Rob was chief marketing officer in charge of Arnold's global sales and marketing efforts. He has been with Arnold almost 10 years.

He received a master's of business administration from the Kellogg Graduate School of Management and a bachelor's of business administration from Iowa State University.

Danfoss is a global manufacturer of energy-efficient pumps and valves that depend on the rare earth magnets produced by companies such as Arnold Magnetic. Danfoss is located in Loves Park, Illinois, also part of our congressional district.

Mr. John Galyen is president of Danfoss North America, a $600 million subsidiary of Danfoss, and oversees the company's most important market. John has 30 years of industry experience. He is a graduate of Northwood University. He also completed a Strategic Leadership Program at the Ashridge Business School in Hertfordshire, England.

Finally, Ms. Christine Parthemore is a fellow at the Center for a New American Security, where she directs the organization's Natural Security Program and natural security blog. She is an adjunct professor at Johns Hopkins University.

Prior to joining the center, she worked with journalist Bob Woodward. She has contributed to the Washington Post, Roll Call, and Atlanta Journal Constitution. She is a graduate of the Ohio State University and has an M.A. from Georgetown University.

One of the reasons we are calling this hearing is that I have heard from numerous manufacturers throughout the country desperately trying to buy these permanent magnets, especially the neodymium iron boron. They are down to two suppliers worldwide and having to pay 50 percent in advance, even before the order is processed.

The people who are using these magnets including Regal Beloit, just over the line, which makes a high iron motor and is using the neodymium iron boron to speed up efficiency by 2 to 3 percent, which is pretty high for a motor.

All over the country, there is a huge shortage of these magnets. It impacts the manufacturing industry to the point where China is sucking American manufacturers into China based upon the fact that they have a monopoly on these rare earths. This hearing is absolutely critical to keeping thousands, if not tens of thousands, of jobs in this country.

Mr. Smith, you are up. You have 5 minutes. When you have about 15 seconds remaining, I will lightly tap. If you go over that, the tapping becomes louder.

Mr. LEWIS. Mr. Chairman might have them hit the button so we can hear them.

Mr. MANZULLO. Okay.

Mr. LEWIS. You have to hit the button.

Mr. MANZULLO. Hit the button in front of you.

Mr. SMITH. Got it. I think I should be on now.

Mr. MANZULLO. I look forward to your testimony.

Mr. SMITH. Thank you, Mr. Chairman. Thank you, Congressman Lewis, for your kind introduction, and other members of the subcommittee.

STATEMENT OF MR. MARK A. SMITH, PRESIDENT AND CHIEF EXECUTIVE OFFICER, MOLYCORP, INC.

Mr. SMITH. You have my more detailed written testimony. So I will try to err on the side of efficiency and try to be as brief as I can today.

This hearing is very timely, Mr. Chairman. I spent last week in China. Indeed, the first part of the week, I had the privilege of touring the iron ore mine in inner Mongolia, where 63 percent of the rare earths are produced for the world as a byproduct from that mine. According to the Chinese officials that toured me, I was the first foreigner ever allowed into that mine.

I spent the latter half of the week at a rare earth conference in Beijing speaking with top government officials and private sector leaders from around the world concerning rare earth industry issues.

Last week, Chinese officials communicated to me and to the world, through this rare earth conference in Beijing and in subsequent public statements, several clear and unambiguous messages about their rare earth policies.

First, while Molycorp currently supplies almost 5 percent, China supplies over 95 percent of the global rare earth demand. And they do not intend to remain the primary supplier to the rest of the world. Instead, they will continue to consume more of their own rare earths and export less.

Second, they see tight global supplies and high prices of rare earths as an “irreversible” trend.

And, third, they believe that the rest of the world needs to start meeting more of their own rare earth demand with their own rare earth supply.

Molycorp has been predicting that China could potentially move from being the world's predominant supplier to a net importer of rare earths by 2014 or '15. If this happens, it will have major implications for our defense as well as other manufacturing sectors in the United States and other allied nations.

Mr. Chairman, if I were to deliver one message to you today, it is this. The time has come to roll up our sleeves and get to work rebuilding our own domestic rare earth manufacturing supply chain. And I can assure you that the men and women of Molycorp have had their sleeves rolled up for several years now and are committed to this effort.

We must continue to move as rapidly as possible to a position where our economy and our national security interests are no longer tied to these declining Chinese rare earth exports.

Moreover, I think it is time we took a page from China's own rare earth playbook. China is—and I might add, very successfully—using its rare earth supplies to leverage growth in its manufacturing base as a means to create hundreds of thousands of jobs for its massive population. Simply put, I strongly believe we can and should do the same.

Consider these facts. We have the geologic good fortune of having one of the richest and largest rare earth mineral deposits in the world at Mountain Pass, California. We have some of the best and most experienced rare earth scientists, chemists, engineers, and workers in the world. And Molycorp has pioneered technological breakthroughs in rare earth processing that will not only make us environmentally superior but will allow us to produce rare earths at the lowest cost in the world, indeed about half that of what the Chinese costs are.

All of this highlights our ability to unleash a job-creating engine here in the United States fueled by our own domestic rare earths, just as the Chinese have done and continue to do in their country today.

As you can see from the photos being shown here, we are making rapid progress to dramatically increase our rare earth production from our current 5,000 tons per year to a level that will be almost 20,000 tons per year at our flagship facility in Mountain Pass.

Over the past year, we went to the capital markets successfully and raised money that we needed for both phases 1 and 2 of Project Phoenix and were successful in raising the money needed for that $781 million capital project.

We remain on time and on budget in constructing what will be the most technologically advanced, energy-efficient, and environmentally superior rare earth manufacturing facility in the world.

Mr. Chairman, I provide in my testimony specific numbers on what we expect to produce and when. Let me just say that, as a result of Molycorp's efforts, the United States is on track to achieve a high degree of independence in overall rare earth production before the end of 2012.

Let me also take a moment to publicly acknowledge the hundreds of men and women who are working virtually around the clock to restore America's rare earth production capacity at Mountain Pass. They are the reason that America is rapidly and confidently moving toward greater independence concerning these strategic materials. And they are doing it safely, I might add, having gone well over 6 years without a lost time accident at Mountain Pass.

In addition to increasing their production of separated rare earth elements, we are working hard to have more integration and do a "mine-to-magnets" strategic business plan. When completed, this will increase the diversity of global supply for a variety of other rare earth-based materials, which are needed for additional job-creating manufacturing sectors.

What can the U.S. Government do to encourage greater independence of rare earth production and more diversity in global supply? I think there are three things in particular. One, we can promote more private sector investment in technology innovation. Today, technology is the ultimate differentiator between Molycorp and the Chinese rare earth industry. It is what is enabling the United States to confidently move to a position of greater independence in rare earths.

Number two, we need to strengthen the fundamental research and development of rare earth materials and our graduate and postgraduate instruction in the basic and applied sciences relative to rare earths.

And, number three, we need to support government and private sector efforts to recycle rare earths.

Mr. Chairman, I would be happy to discuss these recommendations and other issues in more detail. Thank you for the opportunity to testify here today, and I look forward to your questions.

[The prepared statement of Mr. Smith follows:]

Molycorp

SUBMITTED TESTIMONY of

Mark A. Smith
President and Chief Executive Officer
Molycorp, Inc.

U.S. House of Representatives Committee on Foreign Affairs
Subcommittee on Asia and the Pacific

September 21, 2011

Chairman Manzullo, Ranking Member Faleomavaega, and Members of the Subcommittee, thank you for the opportunity to testify before the Subcommittee today and for directing further attention to this topic, which is incredibly important to America's long-term economic and strategic interests.

My name is Mark Smith. I am the President and Chief Executive Officer of Molycorp, Inc., the Western Hemisphere's only producer of rare earth oxides and the largest rare earth oxide producer outside of China. We are headquartered just outside of Denver, Colorado. Our company owns and operates the rare earth mine and oxide manufacturing facilities at Mountain Pass, California. We also have rare earth metal and alloy-making facilities in Tolleson, Arizona, and rare earth oxide manufacturing and metal-making facilities in Sillamae, Estonia.

Let me first note that I am especially pleased to be here discussing this topic with you, given that I spent all of last week in China, meeting with industry and government officials, and speaking on this very subject to an international gathering of Chinese officials and rare earth industry leaders. I also had the opportunity to personally tour the Bayan Obo iron ore mine in the Chinese province of Inner Mongolia, which produces rare earths as a byproduct and is currently responsible for over 63 percent of the rare earth production in the world. According to company officials, this was the first time that a foreigner has ever been allowed to go inside the gate of this enormous facility.

This hearing also is very timely, Mr. Chairman, given what senior Chinese officials relayed last week to me both privately and through their public statements: China "has no intention of remaining the world's major supplier of rare earths and will gradually shift focus to domestic demand." Chinese industry officials also have indicated that tight supplies of rare earths represent an "irreversible" trend, in China's view.

Clearly, this signals China's expectation that it will continue to reduce the amount of rare earths it exports to the rest of the world. It also points to the increasing likelihood of a dramatic shift in the rare earth supply situation – one where China could move possibly from being the world's predominant supplier to a net importer of rare earths.

These announcements comport with Molycorp's expectations. For much of the past decade, our company has been predicting just such a shift would occur by 2014 or 2015.

On the heels of my travels and meetings last week, and informed by more than 25 years in the rare earths industry, I would like to offer some observations to the Members of this Subcommittee on the current global rare earth supply situation. I also will provide some recommendations that are designed to help better position the United States from being completely dependent on China from our rare earth needs.

KEY POINTS

I have three principal messages to deliver to the Subcommittee and Congress today:

First, while China's actions on rare earths may frustrate all of us, I would argue that it is not very productive to spend time blaming China or threatening to launch legal action against China as a means of addressing the current situation in which we find ourselves.

We are absolutely right to seek to understand China's actions and motivations. Those in charge of enforcing international trade agreements certainly need to investigate whether or not these agreements are being upheld. But, ultimately, I believe that our major focus -- as a government and a nation -- should be on rolling up our sleeves and accelerating our efforts to ramp up our own domestic rare earth production capability. We should focus on moving as rapidly as possible to a position where our economy and security interests are no longer tied to declining Chinese rare earth exports.

Second, I believe we can and should take a page from China's own rare earth playbook. They have used their rare earth resources to enormous strategic advantage, particularly as a means of creating jobs for their own people. We should do the same thing. Mr. Chairman, we have the geologic good fortune of having one of the world's richest and largest rare earth deposits at Mountain Pass, California. We have some of the best and most experienced rare earth scientists, chemists, engineers and workers in the world. These assets, coupled with the enormous technological breakthroughs that Molycorp scientists have pioneered, give us the ability as a nation to leverage our own rare earth resources and encourage rare earth-dependent manufacturers to establish operations in this country, creating jobs in the U.S., rather than in China.

The job-creation engine that rare earths have fueled in China can also be a job-creation engine here in the U.S. We have the resources, the technology, and the markets to make this a reality.

My third point is this: it is important to understand that the key to our continuing competitive advantage in global rare earth markets is technology innovation and superiority. Molycorp's advanced technology is already positioning the U.S. to be the world's lowest-cost producer of rare earth elements beginning next year. New technologies we have developed are also positioning us to be the world's most environmentally superior manufacturer of these materials.

The best thing Congress can do is to encourage continued technological innovation. Key to that effort is maintaining robust research and development efforts in this area, as well as strengthening the nation's graduate and post-graduate educational programs in chemistry, physics, engineering and other fundamental areas of applied science.

THE GLOBAL RARE EARTH LANDSCAPE TODAY

As many Members of this Subcommittee are well aware, China now dominates global production of rare earths, supplying approximately 95 percent of the world's demand. With a position this dominant, the world's current supply is almost entirely dependent on the rare earth materials that China chooses to make available for export.

In recent years, China's growing economy -- and its rapidly growing manufacturing sector -- have increased the demand for its own rare earths. As the Chinese in-country demand has increased, we have seen a steady reduction in its rare earth exports.

This trend should come as no surprise. As an increasing share of China's more than 1.3 billion people improve their standards of living, their demand for products like cell phones, computers, electric bikes, automobiles and the like has increased. All of these products require rare earths.

What *has* been surprising, even to those of us in this industry, is the accelerating pace of China's internal rare earth consumption, and the resulting ***rapid*** constriction of its exports. For example, prior to 2010, China had consistently reduced its rare earth exports at a rate of about six percent per year. However, in 2010, its export quotas were tightened dramatically – a full 40 percent reduction from 2009 levels. This created shortages of some rare earths in 2010, and forced prices to increase dramatically.

In 2011, those export quotas were tightened yet again. And, like last year, we are once again faced with global rare earth shortages. This is a critical issue for some manufacturers whose products or technologies require rare earths. There are some companies today that cannot purchase sufficient quantities of the rare earth materials they need at any price.

Another critical trend that we are witnessing is China's efforts to exercise much tighter control over its internal production of rare earths. For example:

- The Chinese government has forced major consolidation of its domestic rare earth industry in the past few years. It is estimated that more than 250 individual rare earth producers have been forced to consolidate into just a handful of major players.

- China is now beginning to enforce in-country production quotas. It recently announced a halt to mining operations at three mines, and has ordered some major rare earth processors to stop operations. Minmetals, one of the largest Chinese rare earth companies, voluntarily shut down its production due to production quota issues.

- The Chinese government is imposing tougher environmental regulations on the industry. In particular, they are tightening water discharge requirements. This is causing some processing facilities to shut down, at least temporarily, until the required improvements can be made. Chinese processors need more revenue to pay for these improvements, which will increase upward pressure on prices.

- The Chinese government has imposed new taxes on its domestic rare earth producers. The owners and operators of these facilities are becoming more vocal about this and want either the taxes voided or prices to go up. From all indications, it will be the latter.

- Earlier this year, China announced a ban until 2015 on approvals of any new rare earth separation projects.

- China is successfully cracking down on illegal rare earth mining and exports, which have been estimated to amount to as much as 20,000 to 30,000 tons of product per year.

All of these steps will negatively impact China's rare earth production. That will further restrict their export capabilities. This will almost certainly exacerbate the current global shortages of rare earths, at least until non-Chinese producers like Molycorp increase production.

The key point is this: we have been focusing on China's tightening of its export quotas. However, as China enforces its own production quotas, export quotas will become increasingly meaningless.

CHINA'S STRATEGIC INTENT: JOB CREATION

To understand China's actions in this space, it is important to focus on that nation's ultimate economic and social motivations.

As China's former Premier, Deng Xiaoping, famously commented in 1992, "The Middle East has oil. China has rare earths." China recognized this key advantage 20 years ago. Ever since, it has focused intently on rare earths production as a job creation engine.

It is estimated that China's workforce adds more than 10 million new workers every year. In pursuit of millions of new jobs each year, China decided to harness its rare earth resources as a strategic, economic asset. With a population of more than 1.3 billion people, social stability is necessarily one of that government's primary goals. And, nothing creates social stability better than economic growth, opportunity, and jobs.

China has always understood that mining and processing rare earth ore into separated elements would employ thousands of workers. But it also understood that moving into downstream manufacturing of products and technologies that utilize rare earths could employ hundreds of thousands of workers.

Thus, China pursued a strategy that centered on giving manufacturers around the world a choice: if you want China's rare earth materials and products, you can either take your chances on securing rare earths in increasingly tight global markets. Or, you can move your manufacturing facilities to China, where you will not be subject to export quota limitations and you can purchase rare earths at a significant discount to global pricing.

For an increasing number of rare earth-dependent manufacturing concerns, the economic choice became very clear. A large number of manufacturing operations have now relocated to China. And, that trend appears to be continuing.

I would suggest that if China is allowed to go further downstream without any real competition, we not only will be completely reliant on them for rare earths, but also on the many end-use products and technologies that use rare earths. This downstream integration by China is happening much faster than anyone realizes, in my view. This fact underscores the urgency for the U.S. and allied nations to encourage their own growth in the manufacturing of advanced technologies that utilize rare earths.

TAKING A PAGE OUT OF CHINA'S PLAYBOOK

China's government-sanctioned and government-enforced industrial policy is not something that that U.S. can or should try to emulate. But we do have the ability to leverage the power of our own very large and very rich rare earth resources to catalyze manufacturing and job growth here in the U.S. By developing a vertically integrated, rare earth material supply chain, we can give manufacturers a viable option of growing their businesses, and creating jobs, here in the U.S.

This is precisely what Molycorp is focused on doing with our "mine-to-magnets" business plan.

The first step in that plan is to complete what we call "Project Phoenix," our $781 million modernization and expansion of our rare earth mining and manufacturing facilities at Mountain Pass, California.

With Project Phoenix, we are creating the most technologically advanced, energy efficient, and environmentally superior rare earth processing facility in the world.

Fortunately, the private capital markets have responded strongly to our project, and have provided capital sufficient to meet our needs for both Phase 1 and Phase 2 of Project Phoenix. Thus, we are now fully funded for the modernization and expansion of our flagship facility at Mountain Pass, California. Even better, this highly complex project is on budget and remains on time for mechanical completion in July 2012.

The first phase of Project Phoenix will enable us to take our current rare earth oxide production level at Molycorp from an estimated 5,000-6,000 metric tons of rare earth oxide (REO) equivalent this year to an annual production of 19,050 metric tons or more of REO by the end of 2012.

In Phase 2 of our expansion, we will grow our production capacity to 40,000 metric tons of REO equivalent by the end of 2013.

To put these numbers in perspective, the U.S. is estimated to consume between 15,000 to 18,000 metric tons of rare earths per year. Thus, our production at Mountain Pass, on a total rare earth oxide, or REO, basis, will meet or exceed most of the United States' consumption by the end of next year.

It is important to note that there may always be some rare earths that the U.S. will need to import from other nations, just as we expect to share through exports some of our rare earths with other nations – particularly to our allies in Japan and the EU.

However, let me emphasize this point: the U.S. is on track to achieve a high degree of independence in overall rare earth production by the end of next year, thanks to the men and women who are working tirelessly at Mountain Pass, seven days a week, to restore our domestic production capabilities.

Beginning next year, we will produce all of the 10 rare earth elements – lights, mediums and heavies – that have commercial applications. We also will be producing at our facility in Sillamae, Estonia, the rare metals niobium and tantalum, which have a number of strategic applications as well.

The second step in our business plan is to move beyond the manufacture of separated rare earth elements, in their oxide form, and go further downstream to the manufacture of value-added rare earth products such as permanent magnets. One acquisition we made this past April was of AS Silmet in Sillamae, Estonia, now called Molycorp Sillamae. This facility is one of only two such facilities in all of Europe, and it expands our oxide production capabilities. It also gives us the ability to move from the oxide stage to the metal stage – a precursor to the manufacturing of permanent rare earth magnets.

This past spring, we also acquired Santoku America, Inc., based in Tolleson, Arizona, the U.S. subsidiary of Japan's Santoku Corp. This provided us with both metal and alloy-making capabilities in the U.S.

With these additions, we are now able to produce rare earth materials and alloys across four of the five steps in the full, rare earth mine-to-magnet manufacturing supply chain. Those five steps are these: mining and milling, oxide production, metal making, alloy production, and permanent rare earth magnet manufacture. To launch operations in the fifth stage, permanent magnet production, we are in advanced discussions with several potential partners to create one or more joint ventures that will allow us to produce these highly valuable permanent magnets.

Finally, and most recently, we completed an investment in Boulder Wind Power, a Colorado-based company that is pioneering a game-changing technology for wind turbines. Boulder Wind's innovative engineering design allows for the manufacture of high efficiency direct drive wind turbines powered by rare earth permanent magnets that do not need dysprosium, a rare earth that is in chronic short supply. Not only will this technology breakthrough help to accelerate the deployment of wind energy turbines that can produce power at an unsubsidized rate of only four cents per kilowatt-hour, but it provides a pathway for large volumes of magnets that will be readily made by Molycorp using rare earths produced here in the USA.

WORLD TRADE ORGANIZATION ISSUES

China may or may not be acting in violation of WTO rules. I am not an expert in this area of the law, and I am not in a position to pass judgment on the legal justification for taking formal action against China in this arena.

However, I believe it is important to consider what may be the practical, real-world outcome of any formal action against China on rare earths.

Because WTO cases generally take many years to adjudicate, initiating action against China may result in that country tightening even further and faster its export quotas to the world. Given that we have no viable supply alternatives, until Molycorp ramps up to full-scale production capacities over the next two years, such a constriction could have very serious impacts on rare earth dependent manufacturers in the U.S. and in allied nations, at least in the short-term.

By aggressively going after China through the WTO, we may end up accelerating the shift of manufacturing operations, and manufacturing jobs, to China over the next several years. And, given that we already face global rare earth shortages today, we may end up forcing some rare earth dependent manufacturers to stop production operations all together.

The law of unintended consequences is one that I believe we cannot ignore when considering the options the U.S. has in the WTO arena.

RECOMMENDATIONS:

Let me offer these action recommendations for your consideration:

1. **Elevate the focus on rare earth issues across the Government.** Japan has spent the last 12 months seeking every way possible to end its dependence on China's rare earths. From exploration projects, to joint production ventures, to recycling efforts, to R&D, they are turning over every stone. The U.S. Congress should pay closer attention to the many different facets of this issue. Today's hearing is a good step in this direction. However, given that rare earth materials are used in so many different products and technologies – clean energy, high tech, communications, national defense, transportation, health care, to name but a few – I would encourage other Committees of Congress to examine the rare earth issue within the context of their jurisdictions.

2. **Focus on promoting private-sector investment in technology innovation**. The technology innovations that Molycorp scientists have developed, and which are being built into our new facility at Mountain Pass, are enabling us to produce rare earths in 2012 at cost of production that will be the lowest in the world. Our production costs on a per kilogram basis will be lower even than that of China. The U.S. government should explore

how it can incent companies to invest aggressively in efforts that give our nation a technological edge. Whether through tax incentives or other mechanisms, the government can play a very constructive role in helping the private sector give the U.S. a continuing advantage in technology.

It is my belief that technology is the ultimate differentiator between Molycorp and China's rare earth industry.

3. **Strengthen U.S. research and development efforts as well as our graduate and post-graduate instruction in the basic and applied sciences.** What is largely driving China's success in moving into higher value downstream manufacturing is the veritable army of scientists, chemists, physicists, engineers, and others who have been trained to explore new processes, technologies, and applications for rare earth materials. China rightfully boasts of having more than 6,000 scientists and researchers who focus on a daily basis on rare earth technologies and applications. In the U.S., we have but a handful of these specialists – and many of those individuals were trained by, and are now work for, Molycorp. The United States' dearth of institutional knowledge in this area must be reversed if we are to emerge again as a global leader in the production of these critical materials, and the many advanced technologies that they enable. We need to undertake a broader range of research and development efforts in the rare earth materials space.

4. **Support private sector efforts to recycle rare earths.** Molycorp is working now to develop the capability of recycling rare earths. One area in particular that we feel is ripe for near-term results is in fluorescent lighting, both the standard and compact bulbs. The rare earths that make these high efficiency lights work are relatively scarce heavy rare earths such as europium, terbium, and yttrium. Molycorp is developing the technology to separate the rare earth phosphors from this waste stream into usable, separated materials once again.

   A key hurdle to making this recycling a commercial success is finding ways to consistently capture the used bulb waste stream. I would suggest that a great place to start is the federal government's own lighting waste stream. The government goes through a lot of fluorescent lights each year. The government – perhaps through the General Services Administration – should quantify this potential material stream and implement government-wide efforts to ensure that the waste processing of this lighting allows for the recovery of the rare earth phosphors they contain. Molycorp stands ready to assist the government in such an effort in any way we can.

As you can begin to appreciate, this is a complex and dynamic industry that clearly has major implications for the United States' long-term economic and security interests. The current supply and demand situation presents us with a challenging set of near-term circumstances. However, we are in a very good position to determine our own fate.

By remaining focused on what we can do to get our own supply chain up and running, we will not only be in a stronger strategic position, but we also will create an important foundation that can help to catalyze manufacturing job growth in this country. This is exactly what I think we all need to remain focused on for the next several years.

I thank the Subcommittee for the opportunity to testify today, and I look forward to your questions.

# # #

Mr. MANZULLO. Thank you.
Mr. Strahs?

STATEMENT OF MR. ROBERT STRAHS, VICE PRESIDENT AND GENERAL MANAGER, ARNOLD MAGNETIC TECHNOLOGIES, NORTH AMERICA

Mr. STRAHS. Thank you, Chairman Manzullo and members of the subcommittee.

Arnold Magnetic Technologies employs 775 people globally, 337 of these in the States of Illinois, Nebraska, New York, and Ohio. The work of about 250 of our employees is directly related to the production of rare earth magnets or precision components containing them. These include engineers, machinists, accountants, material scientists, and general laborers.

We are a tier 1 or 2 supplier and produce rare earth magnets and assemblies sold to approximately 200 customers, many of which of them produce either final products or components. We estimate that our downstream customers employ over 25,000 people directly involved in the fabrication products, including rare earth magnets.

These critical components can be found in all commercial planes, including the 737 and the new 787. They are found in the oil and gas, chemical, and mining industries.

Rare earth magnets are essential to green technologies, including hybrid systems important in reducing our dependence on foreign oil. Perhaps most importantly are the rare earth magnets and assemblies that are found in military weapons systems, such as the F–35, the F–18, Javelin Missile, Precision Guidance Munitions, and military counter measures. They are also being used to develop hybrid and electric power systems for our ships and ground vehicles and many other defense uses.

Today China is the only supplier of rare earths needed to produce the rare earth magnets: Neodymium iron boron, or neo, and samarium cobalt boron magnets. We need to maintain good relations with China as they have established themselves in rare earth supply and for the time being have reserves of heavier earths, such as dysprosium, that are needed to create high-performance magnets.

The Chinese estimate that their known reserves of heavy rare earths may last only 15 to 25 years at the projected demand. So it is vital that alternate supply chains be created.

Due to the export controls put in place in China, prices for products, including rare earths, have dramatically increased. Neo and samarium cobalt magnet costs have increased between 300 and 500 percent in the last 9 months.

These price increases came about not only because of export controls imposed at 2008 levels, when demand was unusually low due to the recession, but other factors contributed as well. These include speculators bidding up the prices of rare earths and China's enforcement of environmental laws, which has stopped illegal mining operations. Increased demand for rare earth magnets for green energy applications in hybrid vehicles and wind turbines has also created price increases.

Industrial users had hoped that prices and supply would quickly return to historical levels, but that is not going to happen in my opinion. Neodymium iron boron is a relatively new magnetic material. And many uses are just coming into the marketplace that rely on this material to make their products more energy-efficient and lighter and smaller than past magnetic materials allowed. So at a time when demand is growing, the reduced supply from China could be crippling to the next generation of energy-efficient appliances, hybrid cars, and wind turbines, not to mention defense systems.

We now have customers considering whether they should move their production to China. Arnold Magnetic Technologies has Chinese facilities, in addition to our facilities in the U.S. and Europe, to maintain a close relationship and source of supply. But this should be an opportunity for the U.S. to step up and reestablish an industry that was started here in the late 1950s but was substantially closed by 2002.

We are here to state the importance of the need to bring back the rare earth industry to the U.S. to protect and grow jobs as well as to control our own sources of rare earths that are so important to green technologies, aerospace, and defense, and energy-efficient motors and generators.

Magnets are ubiquitous, but because they are largely unseen inside the products we use, the public has not realized their significance in our daily lives.

We cannot trade our dependence on foreign oil for dependence on foreign rare earths. The U.S. Government has had a preoccupation with funding battery and solar technologies, but the power that is produced or stored by these technologies will often be generated or consumed by motors and generators that are most efficiently produced with neo magnets. Current and next generation military products from the Joint Strike Fighter to precision-guided munitions to hybrid systems all require rare earth magnets to operate most efficiently.

Tens of thousands of jobs could be created by reestablishing a rare earth industry here in the U.S.

In support of this goal, Arnold Magnetic Technologies has the knowledge base and people in place to produce neo magnets here in the U.S. in addition to the samarium cobalt magnets that we produce, but there are critical issues that only the U.S. Government can address to restart rare earth production in the U.S.

One, intellectual property. Currently Hitachi holds the patents for the production of net magnets and has refused to license any U.S. companies. We would like the support of our Government to work with Hitachi to have licenses granted to allow production of these magnets in the U.S.

Two, stop the illegal importation of unlicensed neo magnets that enters the U.S. either within products or as magnets. This erodes the ability of our company and customers to fairly compete.

Three, inclusion of rare earth magnets into Buy American legislation to allow U.S.-based companies to compete with subsidized Chinese producers of magnets and assemblies.

And, finally, grants or loan guarantees to accelerate the construction of the rare earth industry and magnet production facilities here in the U.S. and add high tech jobs, such as was successfully used to bring back the production of beryllium.

Without these steps being taken, we foresee more jobs going to China, and we see the potential for rare earths mined here in the U.S. to be exported to China to support their production, their green initiatives, and their job growth, further strengthening their global manufacturing dominance.

Thank you.

[The prepared statement of Mr. Strahs follows:]

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MAGNETIC TECHNOLOGIES

Date: September 19, 2011

From: Robert G. Strahs, Vice President and GM Arnold Magnetic Technologies

Hearing Date: September 21, 2011, "China's Monopoly on Rare Earths: Implications for U.S. Foreign and Security Policy,"

Congressional Committee: House Committee on Foreign Affairs, Subcommittee on Asia and the Pacific

Chairman Manzullo and Members of the Subcommittee:

Thank you for the opportunity to testify regarding, "Confronting China's Rare Earths Monopoly: Implications for U.S. Foreign Policy". My name is Rob Strahs and I am the Vice President and General Manager of Arnold Magnetic Technologies.

Arnold Magnetic Technologies employs 775 people globally, 337 of these in the states of Illinois, Nebraska, New York and Ohio. The work of about 250 of our employees is directly related to the production of rare earth magnets or precision components containing them. This includes Engineers, Machinists, Accountants, Material Scientists and general laborers.

We are a tier 1 or 2 supplier and produce rare earth magnets and assemblies sold to approximately 200 customers, many of which then produce either final products or components. We estimate that our downstream customers employ over 25,000 people directly involved in the fabrication of products including rare earth magnets. These critical components can be found in all commercial planes including the 737 and the new 787. They are used by the oil and gas industry where magnets help produce power for sophisticated instruments to allow precision drilling. Rare earth magnets are used in pump systems by the chemical and mining industry., Rare earth magnets are essential to green technologies including hybrid systems important in reducing our dependence on foreign oil. Perhaps most importantly are the rare earth magnets and assemblies that are found in military weapon systems such as the F-35 Joint Strike Fighter, F-18, Javelin Missile, Precision Guidance Munitions and military counter measures. They are also being used to develop hybrid and electric power systems for our ships and ground vehicles and many other defense uses.

Today China is the only supplier of rare earths needed to produce the rare earth magnets neodymium iron boron or neo and samarium cobalt magnets. We need to maintain good relations with China as they have established themselves as the leader in rare earth supply and for the time being, have reserves of heavy rare earths such as dysprosium that are needed to create high performance magnets. The Chinese estimate that their known reserves of heavy rare earths may last only 15-25 years at the projected demand so it is vital that alternate supply chains be created.

Due to the export controls put in place in China, prices for products including rare earths have dramatically increased. Neo and samarium cobalt magnet costs have increased between 300 and 500+% in the last nine months. These price increases came about not only because of the export controls imposed at 2008 levels when demand was unusually low due to the recession but other factors contributed as well. These include speculators bidding up the prices of rare earth stocks and China's enforcement of environmental laws which has stopped illegal mining operations. Increased demand for rare earth magnets for green energy applications in hybrid vehicles and wind turbines has also created price increases. Industrial users hoped that prices and supply would quickly return to historical levels but that is not going to happen in my opinion. Neodymium iron boron is a relatively new magnet material and many uses are just coming into the marketplace that rely on this material to make their products more energy efficient and lighter and smaller than past magnetic materials allowed. So at a time when demand is growing, the reduced supply from China could be crippling to the next generation of energy efficient appliances, hybrid cars and wind turbines, not to mention defense systems.

We now have customers considering whether they should move their production to China. Arnold Magnetic Technologies has Chinese facilities in addition to our facilities in the U.S. and Europe to be close to the supply source. But this should be an opportunity for the U.S. to step up and re-establish an industry that was started here in the late 1950's but was substantially closed by 2002. We are here to state the importance of the need to bring back the rare earth industry in the US to protect and grow jobs as well as to control our own sources of rare earths that are so important to green technologies, aerospace and defense, and energy efficient motors and generators. Magnets are ubiquitous but because they are largely unseen inside the products we use, the public has not realized their significance in our daily lives.

We can't trade our dependence on foreign oil for dependence on foreign rare earths. The U.S. government has had a preoccupation with funding battery and solar technologies but the power that is produced or stored by these technologies will often be generated by or consumed by motors and generators that are most efficiently produced with neo magnets. Current and next generation military products from the Joint Strike Fighter to precision guided munitions to hybrid systems all require rare earth magnets to operate most efficiently.

Tens of thousands of jobs could be created by re-establishing a rare earth industry here in the U.S.

In support of this goal Arnold Magnetic Technologies has the knowledge base and people in place to produce neo magnets here in the US in addition to the samarium cobalt magnets we produce. But there are critical issues that only the US Government can address to restart rare earth magnet production in the US:

1. Intellectual property. Currently Hitachi holds the patents for the production of neo magnets and has refused to license any US companies. We would like the support of our government to work with Hitachi to have licenses granted to allow the production of these magnets in the US.

2. Stop the illegal importation of unlicensed neo magnets that enters the US either within products or as magnets. This erodes the ability of our company and our customers to fairly compete.

3. Inclusion of rare earth magnets into Buy American legislation to allow US based companies to compete with subsidized Chinese producers of magnets and assemblies.

4. Grants or loan guarantees to accelerate the construction of the rare earth industry and magnet production facilities here in the US and add high tech jobs such as was used successfully to bring back production of beryllium.

Without these steps being taken, we forsee more jobs going to China and we see the potential for the rare earths mined here in the U.S. to be exported to China to support their production, their green initiatives and their job growth further strengthening their global manufacturing dominance.

Thank you for your time and consideration.

Mr. MANZULLO. Thank you.

Mr. Galyen?

STATEMENT OF MR. JOHN GALYEN, PRESIDENT, DANFOSS NORTH AMERICA

Mr. GALYEN. Good morning. Thank you, Mr. Chairman and members of the subcommittee.

I appreciate the opportunity to testify on this critical issue surrounding rare earth elements and how it is undermining American competitiveness, in our business area anyway.

Again, my name is John Galyen. I am the president of Danfoss in North America. Danfoss is a leading global manufacturer of compressors, controls, and variable frequency drives, primarily for high-efficiency air conditioning, refrigeration, heating, and motion systems. We have 12 factories in the United States, one of you mentioned, employing somewhere around 3,000 or more employees, not including our large network of U.S. suppliers of parts and services.

Our overall focus is climate and energy. We design, develop and manufacture products to enhance the performance of our customers' products. Innovation and energy efficiency are really critical for us and our competitiveness in the marketplace.

Our Danfoss Turbocor facility in Tallahassee, Florida produces what we call advanced centrifugal compressors. They are used in chiller systems manufactured here in North America and also around the globe. Essentially, we use the magnets to suspend the centrifugal shaft in a magnetic field, generating high efficiencies but also eliminating oil that is problematic in these systems.

It has been a fantastic business for us. We have been growing at an annual rate of 20 percent from 2007 to 2010, despite an economic slowdown. And we are creating jobs, good jobs, in R&D and manufacturing, including in 2011 we have increased employment by 21 percent.

I talk about these are high-paying jobs. The average compensation, if you look at total wage and benefits, is $72,000 per year, well above the average in the Tallahassee area. These sophisticated magnetic bearings really eliminate a lot of the reliability problems that you see in systems, again without using oil. And they operate at very high speeds, but it comes with rare earth elements, disposing them in neodymium. And they are vital for their unique combined capabilities.

The root of the issue is our suppliers tell us that in the early '90s, the Chinese suppliers began to really price out of the market the domestic competition here and around the world. We have seen almost a tenfold increase in our cost of the rare earth elements and let alone in this year alone, we have seen an 800 percent increase.

On top of that, we have got reduced supplies. And, as you mentioned earlier, Mr. Chairman, we are having to pay in advance, as much as 6 months in advance.

Our business in Tallahassee is not the only one affected by this crisis. We are currently developing a new line of variable-speed compressors with very high efficiency for residential air conditioning and light commercial systems that will be used around the world, but the target market for us is the U.S. This technology will result in very large energy savings, as it is already being deployed in many countries, including China and Japan. But the U.S. is behind.

We have started this transformation, but it is in the beginning stages of applying this type of technology, which makes the viability of this technology especially vulnerable now.

The severe cost increases that we have seen this year make the high-efficiency technologies uneconomical. I mean, it is challenging our existing business plans and is jeopardizing some of the energy savings opportunities for our customers and our nation.

My over-arching point is this. China's rare earth elements' strategy is an issue affecting the U.S. and friendly country industries broadly. It is threatening our leadership in such innovative technologies and our ability for our country to meet energy-saving goals. And it appears that their strategy will also attract high technology manufacturing, investment, and jobs to China while offering local supply and price advantage.

Unless the U.S. is willing to pay a steep price in lost opportunities to innovate in energy, defense, and other important areas, the U.S. Government must develop an effective means of countering China's emerging approach to rare earth elements.

I would add that we do not see such a recommendation as anti-China. In a global economy, lost opportunities for progress and innovation affect all economies.

What are we doing about it as an industry? We are reacting to try to migrate to other alternatives, but it takes time. It takes research and effort. So there are no readily available alternatives today.

Our procurement managers are seeking other sources of supply, including new mines, new fabricators, and new processes. But that is not so easily done nor timely. Our research and development teams are evaluating alternative technologies. But finding, testing, and qualifying new alternatives will require years, not months. And we need action now.

In the near term, we need to ensure that there is access to Chinese sources at reasonable prices while U.S. manufacturers, as we have already heard, develop alternative solutions.

I would like to conclude my testimony today by outlining the short and long-term actions that we hope you will consider to minimize the destructive impact on the cost and availability of these elements because these elements are critical to the U.S. manufacturing and trade.

In the short term, we would ask that you reduce the import duties on magnets from 2.1 percent to 0 percent. While we know this is a small step, it sends a signal of actions to alleviate additional price burdens for manufacturers.

We would ask also that you consider temporary subsidies for new mining or processes to bring them online within the next 18 to 36 months. We would also ask that you establish a collaborative approach to encourage China to increase export/production quotas until other sources can be brought online.

Longer term, I think it was brought up by Mr. Sherman that the U.S. should file a claim with the World Trade Organization to pressure China to honor their commitment to the World Trade Organization, not to restrict exports of materials, including the ones we're speaking of today.

And then, additionally, consider Federally funding research of alternative materials, through the National High Magnetic Field Laboratories based in Tallahassee, Florida or Los Alamos, New Mexico.

We ask Congress and the administration to act on this decisively to protect American industry, our economic and technological future, and jobs in the U.S.

Thank you for the opportunity to testify on this important issue.

[The prepared statement of Mr. Galyen follows:]

Testimony of

John Galyen
President

Danfoss, North America

before the
Committee on Foreign Affairs
Subcommittee on Asia and the Pacific

United States House of Representatives

China's Monopoly on Rare Earths: Implications for U.S. Foreign and Security Policy

September 21, 2011

Chairman Manzullo, and Members of the Subcommittee, I thank you for the opportunity to testify on critical issues surrounding rare earth elements and how they are undermining American competitiveness in our area of business.

Danfoss is a leading global manufacturer of compressors, controls and variable frequency drives for high efficiency air-conditioning, refrigeration, heating and motion systems. The US is the largest market for our company. We have 12 factories in the United States that employ over 3000 professional, managerial and hourly employees, and a large network of US suppliers of parts and services with several hundred additional employees.

We design, develop and manufacture products to enhance the energy performance of our customers' products. So, innovation and energy efficiency are critical for us and to our competitiveness in the marketplace.

Rare earths are a group of 17 elements whose unique properties make them indispensible for a wide variety of current and emerging technologies. They are used in applications such as catalysts, glass, electronics, lighting, ceramics, metal alloys, and magnets.

To take one example, the global demand just for magnets containing rare earth elements is expected to increase 10-16% by 2012[1]. Worldwide demand for rare earth elements is expected to exceed supply by 40,000 tons annually unless major new sources are developed[2]. For the magnetics industry the critical elements are Dysprosium (Dy) and Neodymium (Nd). Rare earth elements, as this illustrates, play a decisive and growing role in our nation's economic performance. And as the recent national focus on America's debt has made clear, our economic performance is the most important key to our future as a nation.

After several years of aggressive pricing and rapid growth, China is currently the source of 97% of the world's supply of rare earth elements but holds only 35% of the world's known reserves. China produces 76% of rare earth magnets with Japan supplying 22% and Western Europe the remaining 2%. Today, no nation on earth is more important to the worldwide availability of rare earth elements than China -- no other nation is even close. That position in the global economy is clearly one of special responsibility.

Since July 2010 China has cut export quotas by 40% compared to 2009[3]. Their reported purpose to do so was to protect the environment and licensors. It is evident that in doing so they preserve the resource for their future internal use--to preserve it for the Chinese economy. Unlike much in the international trade arena, rare earth elements managed irresponsibly is a zero-sum game. Managed by China for the short term security, the resulting worldwide shortage would hamper innovation, sustainability, and growth all around the world.

Our Danfoss-Turbocor facility, located in Tallahassee, Florida, produces advanced centrifugal compressors for high efficiency chiller systems, and supplies the global market. These patented compressors contain a unique magnetic bearing system combined with high performance permanent magnet motors that provide energy savings of up to 40% in cooling large buildings compared to conventional chiller compressors. Our business has been growing an average of 20% per year (2007-2010), even during the economic slowdown and creating jobs in R&D and manufacturing.

These sophisticated magnetic bearings eliminate the reliability problems associated with traditional oil-based lubrication systems and enable the compressors to operate extremely efficiently. Powerful magnetic bearings suspend the shaft in a magnetic field without physical contact with other parts, and the highly efficient permanent magnet motor rotates the shaft very efficiently at very high speeds. Rare earth elements dysprosium and neodymium are vital to these unique combined capabilities.

The permanent magnetic motor itself improves energy efficiency in a range of 3% to 4% compared to traditional induction motors.

The elements dysprosium and neodymium, once produced in several countries, are now produced almost exclusively by China, since they have dominated the market by aggressive pricing. Mines in the U.S., Australia, Canada and Brazil ceased or limited production because artificially low pricing in China created a market imbalance that prevented global producers from being competitive. Since February 2011 China has implemented quotas, pricing spikes and lead-time constraints on shipments to countries like the U. S. and Japan.

Mines in the U.S. and Australia have been re-opened to increase supply outside China, and Canada and Brazil are looking to increase production, but these production increases cannot happen overnight.

Chinese control over the mining, processing and exporting of these materials has now driven up the cost of our bearings almost ten-fold. We've experienced an 800% increase in the cost of magnets used in a bearings/shaft/motor kit this year. This dramatic cost increase threatens the viability of the technology and profitability of our factory in Tallahassee. Magnet lead-times have stretched out from 8 weeks to 6 months, and advance payment has been requested to secure supply, making production scheduling and cash flow very problematic.

Our business in Tallahassee is not the only one affected by this crisis. We are currently developing a new line of variable-speed scroll compressors for very high efficiency residential and light commercial air-conditioning systems. These designs include high-efficiency permanent magnet motors, which utilize rare earth element magnets in their rotors. This technology will result in huge energy savings, as it has already done for countries with high electric rates such as Japan (100% of residential applications), Europe (~33% of residential applications), and China (~35% of residential applications). The U.S. has started this transformation but is still in the beginning stages of applying this technology.

Rare earth elements enable compressor manufacturers to develop products such as the variable speed scroll compressor, with higher energy efficiency and performance potential. The severe cost increases we have seen this year could make these highly efficient technologies uneconomical, thereby, jeopardizing a substantial energy-saving opportunity for our customers, as well as our nation, resulting in a regression to old, inefficient traditional technologies.

Rare Earth Elements Impact American Industry

Rare earth elements, especially in magnets, are used in an increasing array of products in American industry including highly efficient motors, wind turbines, hybrid cars, and even lighting products.

In addition, this advanced technology could possibly be critical to our defense industry as well. Defense is not our area of specialization, but we hope Congress will make every effort to understand the implications of rare earth elements in that critical sector.

My overarching point is this: China's rare earth elements strategy is an issue affecting the US and friendly-country industries broadly, threatening our leadership in such innovative technologies and the ability of our country to meet energy saving goals. That China conducts a national industrial policy is well known. It is also known that China's national industrial policy sometimes distorts market dynamics deeply. Rare earth element pricing and availability are a particularly troubling example of such distortions. Its impact cuts near the heart of our ability to innovate in critical technologies.

Unless the US is willing to pay a steep price in lost opportunities to innovate in energy, defense, and other important areas, the US Government must develop an effective means of countering China's emerging approach to rare earth elements. Fundamentally, it is that simple. And I would add that we do not see such a recommendation as at all "anti-

China." In a global economy, lost opportunities for progress and innovation hurt everyone. Whatever China may gain from a restrictive approach, it loses in forgone access to the innovations that would result from more free-flowing trade.

Industry's Actions

We have reacted to mitigate the impact of price shock and supply constraints. We are working with magnet producers to find alternative materials and sources or to use lower concentration of these resources. But the elements in magnetic bearings were chosen for their unique properties and performance, so alternatives are not readily available. Our materials procurement managers are seeking other sources of supply including new mines, new fabricators and new processes. Our research and development teams are evaluating technology alternatives. But finding, testing and qualifying such alternatives will require years, not months, to bear fruit.

We are aware of several bills that have been introduced during the 112th Congress, including HR618, HR952, HR1229, HR1314, HR1388, and HR2011in the House and S.1113 in the Senate. But those are long-term in nature and focus on assessing the American and friendly country reserves of the elements and prospects of bringing them to market. In the interim, we need to ensure access to Chinese sources at reasonable prices while US manufacturers develop alternative solutions.

I would like to conclude my testimony today by outlining short-term, medium-term, and long-term actions that we hope you will consider to minimize the destructive impact on the cost and availability of these elements, elements that are critical to US manufacturing and trade.

Short Term:
- Reduce the import duties of magnets from 2.1 % to 0. While this is a small step, it signals actions to alleviate additional price burdens for manufacturers.
- Enact temporary subsidies until new mining/processing starts (18-36 months)

Medium Term:
- Establish a collaborative approach to encourage China to increase the export/production quota until other sources can be brought on line.

Long Term:
- U.S. should file a claim in the WTO to pressure China to increase quotas.
- Federally fund research of alternative materials (ex: National High Magnetic Field Laboratories, based in Tallahassee and Los Alamos.)

We ask Congress and the administration act on this decisively to protect American industry, our national balance of trade, and our economic and technological future.

Thank you for the opportunity to testify on this important issue.

End Notes:

[1] "REE - Rare Earth Elements and their Uses," www.geology.com, http://geology.com/articles/rare-earth-elements/

[2] "The Rise in Global Demand for Rare Earth," International Business Times, September 19, 2011. http://www.ibtimes.com/articles/126245/20110324/the-rise-in-global-demand-for-rare-earth.htm

[3] "Beijing crackdown hits rare earths mining," Financial Times, Leslie Hooks, August 23, 2011.

Mr. MANZULLO. Thank you.

Ms. Parthemore?

STATEMENT OF MS. CHRISTINE PARTHEMORE, FELLOW, CENTER FOR A NEW AMERICAN SECURITY

Ms. PARTHEMORE. Thank you. Mr. Chairman, Ranking Member Faleomavaega, and other members of the subcommittee, thank you for the honor of appearing here to testify.

While I concur with the remarks of my fellow witnesses today, as a fellow at a nonpartisan and nonprofit think tank here in Washington, my perspective is a little bit different on the rare earths challenge.

My comments to the committee are based on years spent conducting academic research on the long history of the United States Government trying to minimize the foreign policy and national security risks surrounding its natural resource demands.

One thing that is clear from this history is that Congress has consistently been the leading edge of identifying U.S. security and foreign policy vulnerabilities related to minerals and other natural resources. It is clear by this hearing today that Congress is once again on this leading edge in terms of understanding the challenge, the current challenge, brought to us by rare earth elements.

The risks to U.S. foreign policy and national security surrounding China's near total monopoly on rare earths are clear. It allows mineral suppliers easy leverage over the United States, creates roadblocks for achieving other U.S. foreign policy goals around the world, especially in Asia and the Pacific region, and can ignite trade disputes that entangle other U.S. security interests, create supply disruptions that can drive price spikes and lags in delivery, including for defense equipment. And, most important, the United States may also lose ground strategically if it continues to lag in managing mineral issues as countries that consider assured access to minerals as far more politically important are increasingly setting the rules for trade in this area.

In terms of helping to prevent supply disruptions that affect U.S. businesses and America's allies, based on my research, government officials can watch for a series of warning signs that minerals are likely to become strategically problematic or challenging to U.S. interests; for example, political instability in supplying countries, lack of stockpiles by our Government, by our allies, and by domestic businesses, or just generally increasing demand and new competitors capturing large market shares.

The historical concentration of world supplies in the hands of just a few actors is the single most glaring warning sign that minerals will trigger problems for the United States. This is certainly the case with rare earth supplies from China today. And, put simply, as long as we face the situation of near-complete control over rare earth supplies by China or any single country, I do not expect the risks I mentioned to decline.

Moving forward, it is important to note that these challenges are ultimately manageable and future foreign policy challenges related to rare earths and other minerals are preventable. The trends leading to China's dominance in the supply of rare earths have been clear for years. And its behavior with respect to its rare earth industry should have been pretty predictable given its past behavior and the historical patterns that other supplier countries have exhibited.

So, first and foremost, I recommend that the United States Government can act to improve its ability to foresee foreign policy and security challenges regarding minerals. For example, the Departments of Defense, State, and Energy can integrate conflicts over minerals and raw materials into relevant war games and scenario exercises, which they conduct on a regular basis as a way of thinking freshly through these challenges.

The Defense Science Board could conduct a new assessment on the changing nature of its different supply chains, including more extensive consideration of minerals and raw materials, than has been the case in its last two reports focused on supply chains.

Greater information sharing among U.S. Government agencies and with the private sector and internationally would be helpful. Some of my fellow witnesses are engaging in that, clearly, as well as the chairman of this committee mentioned his own information exchanges.

Congress can also play a critical role in preserving the ability to collect and analyze data that the government has expanded for the past 2 years through its programs in the Department of Energy and USGS.

Additionally, the U.S. Government has several concrete options for mitigating challenges, like what we are experiencing now with rare earths. It could leverage its relationships with defense contractors so that the government can better prevent supply chain vulnerabilities. They can provide other countries with leverage over the United States that potentially cause major disruptions.

Congress and the executive branch should continue updating stockpiling policies with the Department of Defense. The U.S. Government can create incentives to reduce consumption and promote recycling and develop substitutes. Research and development funding and loan guarantees can be useful mechanisms for doing this.

And while domestic production is not a panacea for every mineral and for all foreign policy challenges related to minerals and raw materials, in the current challenge surrounding rare earths, domestic production would clearly help mitigate the geopolitical tensions and security risks that we have at hand.

In closing, because disputes related to natural resources tend to be preceded by clear warning signs, complacency is probably the single biggest challenge for the U.S. Government. This committee must, therefore, be commended for calling a hearing today on U.S. challenges with rare earth minerals.

And I hope that research we have conducted at the Center for New American Security can help with the current challenge and assist in preventing this history from repeating itself again in the future.

Thank you. And I look forward to your questions.

[The prepared statement of Ms. Parthemore follows:]

CONGRESSIONAL
TESTIMONY

**China's Monopoly on Rare Earths:
Implications for U.S. Foreign
and Security Policy**
Prepared Statement of Christine Parthemore

Center for a
New American
Security

September 21, 2011

Testimony before the House Committee on Foreign Affairs Subcommittee on Asia and the Pacific

Prepared Statement of Christine Parthemore
Fellow, Center for a New American Security

Reliable access to critical minerals is a matter of both economic and geostrategic importance to the United States. Although concern about access to minerals waxes and wanes, it is rising now due to increasing demand, new competitors capturing large market shares, limited information sharing and the changing nature of the defense industrial base and the broader economy. These same trends can interfere with American foreign and defense policy goals and give mineral suppliers easy leverage over the United States and other countries reliant on global supply chains. Today, no minerals are more troubling to U.S. security and foreign policy than rare earth elements.

China's current dominance of rare earths exports is at the heart of this challenge. Its 2010 cutoff of rare earth elements – a unique set of minerals that are difficult to process yet critical to many high-tech applications – attracted particular attention. After Japan detained a Chinese trawler captain over a skirmish in the East China Sea, Japanese companies reported weeks of stalled shipments of rare earths from China amid rumors of an official embargo. This may sound like a minor trade dispute, but China currently controls production of about 95 percent of the world's rare earths, which are critical to building laser-guidance systems for weapons, refining petroleum and building wind turbines. Coinciding with possessing this incredible leverage over the rest of the world, China has also reduced its export quotas for these minerals and temporarily halted production. For its part, the Chinese government contends that it did not put any formal export embargo in place, and that its plans to reduce exports simply reflect the need to meet growing domestic demand for rare earths and address environmental concerns. Still, Japan and China experienced further strain in their already tense relationship as a result. Feeling blindsided, some in the United States characterized the situation in a manner that demonized China rather than using the opportunity to better understand the true nature of U.S. supply chain vulnerabilities related to rare earths or other minerals.

These tensions with China concerning the supply of rare earth elements should challenge U.S. policymakers not because the United States' import dependence is inherently problematic (which it is not) or because rare earth minerals are geologically scarce (which they are not). Rather, rare earths deserve attention because U.S. supply options are currently limited: Supplies are concentrated mostly in the hands of one supplier with its own rising demand, and the United States today has no good options for recycling rare earth minerals or substituting more easily obtained minerals. While China is nearly the sole producer and exporter of rare earths today, it does not possess a permanent "corner" on this market. Indeed, China holds only about half of known world reserves – not a terribly high concentration. Even more important to the current circumstances, the United States possesses rare earth reserves that will be economical to produce, which will be an important means of mitigating the foreign policy challenge surrounding rare earths while creating domestic jobs.

The risks to U.S. foreign policy include rare earths or other mineral-related tensions creating new roadblocks for achieving U.S. foreign policy goals around the world, especially in Asia, trade disputes that entangle other U.S. security interests and unintentionally funding human rights atrocities and fueling black markets. In worst-case scenarios, supplies of minerals that the United States does not produce domestically may be disrupted, creating price spikes and lags in delivery. Even short of major supply disruptions, sometimes-hostile supplier countries can exert leverage over the United States by threatening to cut off certain key mineral supplies. The United States may also lose ground strategically if it continues to lag in managing mineral issues, as countries that consider assured access to minerals as far more strategically important are increasingly setting the rules for trade in this area.

Several specific defense assets have also been identified publicly as requiring rare earths in their production and operation. These include Joint Direct Attack Munitions (JDAMs), jet fighter engines, antimissile defense systems, smart bombs and night vision goggles. Notably, the demand for rare earths in defense equipment has changed dramatically over the past few decades. The defense industrial base is different from previous eras. Many telecommunications, aerospace and other assets that the U.S. military relies on today have both civilian and defense applications. Supply chains for defense assets are also fully globalized today, increasing the potential for international actors to affect defense production – and to use this power for political leverage.

It is critical to note for this committee's consideration that the security-related repercussions go beyond the direct effects on the United States. China's actions regarding rare earths are affecting U.S. allies such as Japan and several NATO partners. When Chinese rare earth exports to Japan were halted in 2010 as part of a broader dispute between these two countries, the United States was forced to dedicate time and great effort to trying to ease tensions and resolve the disputes at hand.

Moving forward, it is important to note that these challenges are ultimately manageable, and future foreign policy challenges related to rare earths and other minerals are preventable.

First, lessons from the history of U.S. mineral import disruptions and trade disputes indicate that the current rare earths issues with China should have been predictable. In previous disruptions of minerals critical to defense assets and private sector demand – rhenium, uranium and cobalt, for example – supplier concentration appears to be a consistent and strong warning sign that exporting countries are likely to use their mineral supplies for geopolitical leverage. The global trends leading to China's dominance in supplying rare earths exports have been clear for years.

China's behavior has also been logical and relatively predictable concerning rare earths over the past few years. Given its government's high premium on social stability, it was a safe assumption that it would eventually focus greater attention on reducing the environmental impacts of rare earths production. It is also predictable that the Chinese government would act to wield the political power and strategic advantage its corner on rare earths supplies has created.

To better prevent foreign policy and security challenges arising from these circumstances in the future, U.S. policy should focus on:

- Preventing supplier countries and companies from wielding undue leverage over the United States.
- Mitigating fiscal risk and cost overruns to federal agencies.
- Reducing vulnerability to supply disruptions through supplier diversification, especially for critical military assets.
- Ensuring the ability of the United States to meet its economic growth goals in clean energy and other high-tech fields.

Specifically, the U.S. government can mitigate the geopolitical and security risks of global trade in rare earths and other minerals by taking the following measures.

Administration officials and Congress should regularly identify and prioritize the minerals most important to defense acquisitions, energy innovation and other key functions. Today, rare earths are clearly the country's biggest challenge, but other minerals may be equally problematic in the future. Government officials should evaluate mineral issues proactively as a regular, ongoing part of their operations. The Department of Defense, for example, has been largely reactive, responding to the recent rare earths disruptions and issuing one-off reports. By contrast, the Department of Energy has adopted a proactive approach that prioritizes the minerals most important to its core missions. Specifically, government officials can watch for warning signs that minerals are likely to become strategically problematic or challenging in terms of protecting U.S. foreign policy and national security interests. These warning signs today include supplier concentration, political instability in exporting countries, lack of U.S. stockpiles, lack of substitutes and an inability to recycle and recover critical minerals. Interagency communication and coordination to relay these warning signs to key officials around the government and to Congress will also be crucial.

The Department of Defense should conduct new assessments of defense supply chains. Developing a proactive and prioritized approach will require serious consideration of the future of warfare, drawing on expertise from other government agencies, academia, non-governmental organizations, think tanks and private industries. While DOD is currently reviewing rare earths in its supply chains, its efforts must not end with consideration of rare earths. The Defense Science Board should conduct a new assessment building on its 1999 and 2008 studies examining the changing nature of defense supply chains, to include more extensive consideration of minerals and raw materials. These two studies outlined many of the key dynamics that are heightening mineral and raw material concerns today and described DOD's increasing dependence on dual use technologies and global supply chains. However, neither study focused specifically on control of minerals or raw materials, which could give suppliers strategic leverage over the United States. Beyond these omissions, the nature of minerals trade and the global supply system have changed enough in the past five years that an update is warranted.

To protect the U.S. government's ability to manage critical minerals appropriately, Congress should protect the government's role in analyzing critical mineral vulnerabilities and producing its own data. As Congressional leaders in both political parties strive to reduce spending and seek efficiencies, they should maintain a strong U.S. government capacity for research and analysis – a public good that is both necessary to protect U.S. interests and undersupplied by the private sector. Without vigilance, the United States risks being blindsided by regular trade disputes and supply disruptions, and by countries exerting political leverage. Improving how the U.S. government handles mineral issues should not require major increases in manpower or spending. But the administration and Congress must maintain the existing capacities and preserve the knowledge infrastructure that the government has redeveloped in the past few years in the Department of Energy and U.S. Geological Survey. In addition to continuing to produce good data, the U.S. government can do more to leverage its relationships with contractors. The private sector will continue to withhold important information in order to keep information proprietary or because it could be perceived as harmful to the bottom line if shared with the government. But when DOD, for example, has billion-dollar contracts with suppliers for critical military assets, it should be able to have contractual requirements that these companies share information about major supply chain vulnerabilities that can provide other countries with leverage over the United States or potentially cause major disruptions.

The Department of Defense should integrate conflicts over minerals and raw materials into relevant war games. One of the chief risks in ignoring access to critical minerals is the leverage such negligence can provide to suppliers, which alters the strategic context in which DOD operates. Exploring how disruptions or threats of disruptions in mineral supplies could affect various American interests would provide valuable information for U.S. policymakers. Relevant games should include a range of scenarios in which supplies of minerals critical to defense equipment are cut off for extended periods of time and supplier countries use embargoes for political leverage. Major seabed mining sites should be included as strategic locations in games focusing on the East and South China Seas and the Arctic, among other locations, just as energy resources and storage facilities are mapped in considering assets that countries may protect or target today. Appropriate scenarios would also include those involving great unrest or major, long-term strikes that halt mineral exports from Latin America or South Africa.

Congress and the executive branch should continue updating stockpiling policies. Stockpiling critical minerals exhibiting several warning signs (for example, those important to current and future defense production, concentrated in the hands of only a few suppliers and also experiencing high global demand growth) remains one of the best policies for ensuring supplies, especially for DOD. Despite Pentagon efforts to improve U.S. stockpile management, many members of Congress still worry that DOD is not taking threats of minerals supply disruptions seriously enough, and that it may be placing too much faith in the private sector to address the strategic threats posed by threats of supply disruptions to critical minerals. To mitigate these concerns, DOD should be more transparent about its mineral policies with Congress and other government agencies, including its process of reconfiguring the stockpile into an inventory system that focuses on mitigating risks and watching for warning signs such as supplier concentration. Even if Pentagon officials believe that they can develop proper inventory strategies to hedge against challenges to military readiness, they will still require Congressional support for their efforts to continue modernizing the stockpiling system.

The U.S. government should create incentives to reduce consumption and promote recycling and recovery when its security and foreign policy interests are on the line. My research has focused primarily on the nature of current and potential *supply* challenges, but solutions must also include *reducing demand* for minerals that see major disruptions or erratic prices. In the recent rare earths case, the private sector responded by providing some capital for a domestic mining operation to resume. While helpful to the current rare earths circumstances, such private sector action does not always solve the foreign policy and geopolitical challenges the U.S. government experiences. In particular, for minerals that private companies will not reliably produce or more defense-specific applications, U.S. government interests may be at stake while private interests are not. Policymakers can maximize the potential of substitution and recycling by clearly identifying the minerals for which U.S. government interests are affected most directly, and then offering incentives to develop substitutes for these minerals. The Departments of Defense and Energy already have mechanisms for offering low-interest loan guarantees for businesses in a broad range of strategically important fields, from semi-conductors to military assets to energy infrastructure. Similarly, these agencies can use loan guarantees to facilitate production or advance research and development related to minerals, including lending funds to support research on the more efficient use of rare earths, rhenium or lithium in defense or energy applications. In the case of loan guarantees, it will be important for the country's leaders to balance budget priorities and national security concerns while minimizing protectionist tendencies.

Finally, Congress and the Executive Branch should promote information sharing with the private sector and internationally. Regular dialogues and information sharing among the U.S. Departments of Energy, State and Defense, and with industry and international stakeholders, can be a cost-effective means of helping the U.S. government prevent mineral disruptions and trade disputes from negatively affecting U.S. foreign policy goals, defense readiness or economic growth.

Because disputes related to natural resources tend to be preceded by clear warning signs, complacency is perhaps the biggest challenge for the U.S. government. This committee must therefore be commended for calling a hearing on U.S. challenges with rare earth minerals. And while the rare earths challenge is perhaps the most important foreign policy and security problem the U.S. government currently faces with regard to natural resource imports, it unfortunately does not mark the last time the country will face these types of issues given rising demands for finite natural resources. It is critical for the country's leaders to extract lessons from this conundrum in order to manage the current tensions over rare earths with China, and to reduce the risks of similar problems impinging on American foreign policy and security goals in the future.

Mr. MANZULLO. Thank you.

Eni, I want to thank you for bringing up the issue of the ionic clays, the rare earths that are found at the bottom of the seabed. You have lots of water around your district, don't you?

Mr. FALEOMAVAEGA. Mr. Chairman, I wanted just to share with you a bit of information because it does include the issue of rare earths in the Pacific. We call it seabed minerals: Manganese nodules that contain cobalt, manganese, copper, so many other different rare elements, quite extensive throughout the Pacific region.

And what I have come to realize is that we have not done a very good job in putting our focus on this issue, just as has been the testimony of our friends here before the panel. But I will

Mr. MANZULLO. Thank you.

Yes. I have a very basic question to educate us. Would you give examples of where rare earths are used by themselves and then where rare earths are used in the magnetic form? There are two different applications here. Anybody?

Mr. SMITH. Mr. Chairman, I would be happy to answer that question. Elements like cerium are used primarily to polish glass or they are used in the catalytic converters in our automobiles so that we meet the emissions standards set by the U.S. Government.

Lanthanum is primarily used in two applications. One would be FCC catalysts, which is a unit at a refinery that takes crude oil, breaks the hydrocarbon chains and turns it into gasoline for our vehicles. The other primary use is lanthanum metal, which goes into nickel metal hydride batteries, which runs all of the hybrid vehicles today. Those would be your two primary nonmagnetic rare earth elements.

Mr. MANZULLO. Then would you give an example of the application of the magnetic rare earths?

Mr. SMITH. Yes, sir. The application of magnetic rare earths, which would be primarily neodymium, praseodymium, and dysprosium—sometimes terbium can be used as well—those would be used in things like hybrid vehicles, electric vehicles, permanent magnet generators in wind turbines, and many of the products that my esteemed colleagues here on the panel make as well.

Mr. MANZULLO. Why are they called permanent magnets?

Mr. SMITH. I would be happy to answer that question, but Mr. Strahs as the magnet manufacturer might want to answer that.

Mr. MANZULLO. This is a very basic question.

Mr. STRAHS. Thank you, Mark.

A permanent magnet is a material that once it is magnetized, it will stay magnetized essentially forever.

Mr. MANZULLO. The witnesses today have set forth to me the full range of the issue with the rare earths. I would like to address my question to—is it Mr. Galyen?

Mr. GALYEN. Galyen is the proper pronunciation.

Mr. MANZULLO. Galyen?

Mr. GALYEN. Yes.

Mr. MANZULLO. There seems to be a lot of conflict in the country today, not a lot of conflict, maybe some misunderstanding as to whether or not there is really a shortage of rare earth elements. When your representative stopped by my office and told us about the centrifugal chiller that is made in Florida, he said that it is becoming more and more difficult to get those permanent magnets. Could you elaborate upon that?

Mr. GALYEN. Yes. Probably you got more direct from the source today, from the CEO, I would assume, Ricardo Schneider. But I think our biggest concern, really, is not so much the availability. It is concern over availability, but it is more so the long lead time; in other words, going out to 6 months in lead time and also having the price again increase tenfold, including 800 percent this year.

So I think as China looks to set up export restrictions, the amount, then our availability, especially as the demand for the material goes up, causes us great concern for price but also for availability.

Mr. MANZULLO. When you have a long lead time like that, what does that indicate to you?

Mr. GALYEN. Shortage.

Mr. MANZULLO. Ms. Parthemore, could you comment on that? You bring a unique perspective to this.

Ms. PARTHEMORE. Comment on which, the shortages?

Mr. MANZULLO. The shortages, if you feel comfortable to do that.

Ms. PARTHEMORE. Again, so a lot of my research on this has looked at historical trends and past disruptions. And there is nothing about the current situation with rare earths that is atypical from the history of past experiences, particularly with minerals that are important for defense manufacturing equipment.

Whenever you see all of the signs that we have seen in the past 3 or 4 years with China and its exports of rare earths, all of those warning signs were there that we were going to start seeing shortages and that China, whatever the exporting country is—in this case, it is China—was going to use those shortages and their control over the entire export sector for political leverage and tie it in with other strategic and security and foreign policy challenges that we have with them.

So, again, I am not happy to hear that American businesses are experiencing these kinds of shortages. Again, from looking at the history of this for the country, it is not surprising at all.

Mr. MANZULLO. In speaking to manufacturers today, my understanding is that as technology evolves, to make, for example, electric motors more efficient, there is more demand for the neodymium iron boron not only in components that exist today but in components for new products that are coming out. Do you want to take a stab at that, anybody? Mr. Galyen?

Mr. GALYEN. Yes. Sure. I will. In fact, I mentioned it briefly. You know, we make the very large compressors down in Tallahassee. So we are ranging from 600- to 200-ton. And you have a market globally in the, let's say, tens or the hundreds of thousands.

We are developing today compressors for the residential air conditioning market in the U.S. That is a market that, even depressed with the construction industry, is 5 million units a year. And we plan on using permanent magnet motors to get the maximum efficiency for variable speed of those compressors.

And that business plan is being now put at risk. And we have been investing there significantly for years.

Mr. MANZULLO. The reason for using the permanent magnets in the motors is to increase the efficiency of the air conditioners and, therefore, to save energy. Is that correct?

Mr. GALYEN. Absolutely. You are generally looking at 30 percent or so improvement in system performance.

That is not just pure motor efficiency. But when you incorporate variable speed, you are actually able to—rather than turning it on and off, you are able to follow the demand load, control the temperature, humidity, comfort, all of those kinds of things, very accurately.

Mr. MANZULLO. So, cutting-edge technology in air conditioning really depends upon the availability of these permanent magnets. Is that correct?

Mr. GALYEN. Correct. And most of the research and development has been around these rare earth elements. There may be others, but it is going to take us some time to try to figure that out.

Mr. MANZULLO. Mr. Faleomavaega?

Mr. FALEOMAVAEGA. Thank you, Mr. Chairman.

I fear that I don't want to take Mr. Smith's statement out of context, but I do want to quote this from you, Mr. Smith. And, again, I think it does add some substance to our hearing this afternoon.

You said that it is not very productive to spend time blaming China or to seek legal threats or sanctions or whatever against China. It seems to me that at this stage when China now controls 95 percent of the world's market on rare earths it is because they have been working on it for years.

My question is, what have we been doing for all of those years? Why are we in the situation that we are in now where we have to import from China? Are we blaming China for its success, the fact that we have to provide 1.3 billion people with their needs and jobs and all of this?

I just want to catch that note from Mr. Smith's statement. Can you elaborate on that, Mr. Smith?

Mr. SMITH. Yes. I would be happy to address that, sir. And it is a very good question. And thank you for asking for clarity.

Molycorp's position on that is that the United States should take whatever measures it needs to. And certainly actions by the WTO or anything else, those are legal channels that are available.

Our concern about taking those measures is that the ability to make something happen under those measures takes a lot of time. And the problem that we have now is immediate. And we need to act. We need to not depend on those legal actions to get where we need to go today. We really need to roll up our sleeves, get to work and solve the problem, which we can do domestically.

Mr. FALEOMAVAEGA. How much does China spend in developing this industry or has it spent for all these years in developing rare earths?

Mr. SMITH. I don't have a precise figure on that, but I do know that they have over 6,000 scientists dedicated to nothing more than the research and development of rare earth processing and uses of rare earth minerals.

Mr. FALEOMAVAEGA. And how many scientists do we have, in contrast?

Mr. SMITH. Molycorp has about 25 research scientists.

Mr. FALEOMAVAEGA. 25 to 6,000 scientists. That is a real good combination.

Mr. SMITH. However, I would add, sir, that I would take my 25 against their 6,000 any day. [Laughter.]

Mr. FALEOMAVAEGA. All right. I understand China graduates about 100,000 engineers a year. How many engineers do we graduate a year?

Mr. SMITH. I don't have a clue on that.

Mr. FALEOMAVAEGA. Yes. Well, I appreciate your response to this because you had mentioned also that you were visited—was it in Mongolia that you visited?

Mr. SMITH. Yes. Mine in inner Mongolia.

Mr. FALEOMAVAEGA. Did you visit Mongolia proper?

Mr. SMITH. I did not get that far, no.

Mr. FALEOMAVAEGA. You should because there is tremendous wealth of minerals and potential resources available in Mongolia, not necessarily in—well, inner Mongolia is part of China.

I like the challenge you offered. Do we have the resources? Do we have the technology or the markets? Where do we go from here?

Mr. SMITH. We keep doing what we are doing, sir.

Mr. FALEOMAVAEGA. Should the Congress be involved in offering subsidies or some way of start-up capital to assist our companies or to help you in this industry to develop this industry?

Mr. SMITH. I will let Congress make that decision on other members of the industry, but we have all the capital we need. And we are fully funded for our project.

Mr. FALEOMAVAEGA. I see. How much capital are you utilizing right now in developing the industry, about?

Mr. SMITH. It will take us $781 million to put our new Mountain Pass Project Phoenix into operation.

Mr. FALEOMAVAEGA. Is that in contrast to the green energy program that we are trying to develop? Are rare earths part of the green energy dynamics in terms of the industry that it develops?

Mr. SMITH. They absolutely are.

Mr. FALEOMAVAEGA. Okay.

Mr. SMITH. And it is our humble opinion that without them, the green energy technologies that all of us want and desire today will not be possible.

Mr. FALEOMAVAEGA. And I didn't mean to just ask Mr. Smith. Please, I would welcome the members of the panel to join. We are looking at potentially at how many jobs. If we get this industry done right within our own domestic consumptions and needs and the means for our military for private sector consumer needs, what are we looking at?

Mr. SMITH. for Molycorp's mine to magnets business strategy, we are looking at a total of over 1,000 direct jobs just in Molycorp alone. And then, of course, there will be the multiplier effect because of all of these direct jobs that are created.

Mr. FALEOMAVAEGA. Approximately how many Chinese workers have developed out of this industry since the Chinese have been doing this for years? Approximately how many people are employed in China for this besides the 6,000 scientists?

Mr. SMITH. I don't have a clear number on that. My estimate is that it is well into the tens of thousands of people.

Mr. FALEOMAVAEGA. Please, gentlemen, you are welcome to join in the dialogue. I know one specializes in air conditioning, the other one on magnetics. And I totally envy you. I have to plead my ignorance about the industry.

The fact is how many Americans know anything about the industry? I would say less than 1⁄10 of 1 percent know anything other than the fact you turn the air conditioner, you do all of this. But beyond that, are we looking at a possible multibillion-dollar industry if we work this thing right?

Mr. STRAHS. I think from our standpoint, absolutely. Neodymium magnets are critical to green technologies, the hybrid cars. We need to bring hybrid car manufacturing to the United States. They need the neodymium for that.

Mr. FALEOMAVAEGA. And we have the substance in our own country.

Mr. STRAHS. Right.

Mr. FALEOMAVAEGA. We don't need to import it from China. Am I correct?

Mr. STRAHS. That is correct.

Mr. FALEOMAVAEGA. Thank you, Mr. Chairman.

Mr. MANZULLO. Mr. Johnson?

Mr. JOHNSON. Thank you, Mr. Chairman, for holding such an important hearing today on the importance of rare earth procurement to the U.S. economy and China's troubling monopoly of these elements.

The extremely wide range of applications for rare earth minerals from cars to medical devices to military jets speaks to the significance of these elements. Many of these consumer and defense products contribute to vital industries that have kept our economy strong and our nation at the forefront of technological innovation. And, yet, the U.S. is almost completely dependent on China for all aspects of the rare earth supply chain.

China's monopolistic control over the mining processing and exporting of rare earth elements has drastically driven up costs for U.S. manufacturing companies, particularly after China cut export quotas by 40 percent last year.

And the availability of rare earth elements has increasingly diminished as China diverts these resources to internal domestic production. However, the real problem here isn't so much about China's actions but more about our own inaction.

According to your testimony, Mr. Galyen, China is currently the source of 97 percent of the world's supply of rare earth elements but holds only 35 percent of the world's known reserves.

As portions of China's reserves run out and it continues to restrict its own production quotas, resolving rare earth trade practices with China will no longer be the answer.

I believe we must look to our own rare earth elements strategy or the lack thereof. This is not only an opportunity for American mining and processing but also for American manufacturing.

According to the U.S. Geological Survey, 13 million metric tons of rare earth elements exist within known deposits in 14 states.

Last week President Obama unveiled his newest plan for jobs. To me, our rare earth potential as an obvious solution is staring us in the face. This could be a far-reaching investment in our nation's economic future, not just something to give us a near-term economic jump start over the next few months, but also in creating long-term jobs here at home. Such an investment also has serious national security implications. As China attempts to build up its military, another source for rare earths used by the U.S. defense industry will become pivotal.

I do have a few questions. Mr. Smith, in your testimony, you outlined the steps that Molycorp has taken in anticipation of China's rare earth supply limitations.

You also point out that we do have the ability to leverage the power of our own very large and very rich rare earth resources to catalyze manufacturing and job growth. With so many U.S. stakeholders in the development of a new supply chain, how have mining, manufacturing, and other industries readied themselves to meet this demand in a potential U.S. market?

Mr. SMITH. Sir, we have been working for over 8½ years to make sure that we develop new technologies so that we are not subject to the cost limitations that we were subject to prior to this time.

The price that China could produce their materials was much lower than ours, not something we were proud of. But we have worked on that issue feverishly for 8½ years. And we have developed our own innovative technologies right here in America that will allow us to produce at half the cost of what China does today.

Mr. JOHNSON. Okay. Mr. Strahs, based on known deposits of rare earth minerals in the United States, how much of a role do you believe the U.S. could play in meeting this future demand once Chinese reserves are depleted?

Mr. STRAHS. I think certainly the United States and production here could fulfill all of our needs. That would be easy to do. The first step, though, even once the materials are available, is the patent issues that need to be dealt with. So currently there are patents held by Hitachi.

So, for instance, in Arnold today, we could be producing neodymium iron boron magnets within 12 to 18 months. However, we can't do that because there are patents in place that don't allow us to. So we need to address the licensing issue.

Mr. JOHNSON. In terms of going after our own rare earth resources here in America, have any of you experienced regulatory issues or barriers to being able to go after those elements?

Mr. SMITH. We have not experienced any, sir. And we have been working very hard on that. We have all of our permits in place, which are good for the next 30 years.

Mr. JOHNSON. Okay. Well, as a member of the Natural Resources Committee, I have had the chance to explore some of these issues from another viewpoint in other hearings back in June. Businesses nationwide have highlighted the importance of permitting reform in the U.S. as a crucial step needed to be able to develop a comprehensive rare earth policy.

And I would commend to the committee to look at the National Strategic and Critical Minerals Policy Act. This bill would coordinate a government-wide survey of our national mineral policy, suppliers' demands and other critical factors impacting mineral development to eliminate our dependence on foreign sources for rare earth elements.

And, with that, I yield back, Mr. Chairman.

Mr. MANZULLO. Mr. Duncan?

Mr. DUNCAN. Thank you, Mr. Chairman.

I just want to piggyback on some things Mr. Johnson talked about because I, too, serve on the Natural Resources Committee here in Congress. And we have had at least one, if not more than one, committee hearing about rare earth minerals, about mining practices in this country.

We had a hearing today on ANWR. And the theme is very prevalent when we talk about rare earth minerals. And that is jobs. These are American jobs that could be created, maintained, and expanded through lessening of regulations and opening up Federal land for production of these rare earth minerals.

I visited a company in my district that takes rare earth minerals and develops the catalyst for catalytic converters but also the catalyst for a lot of chemical processes using gold, platinum, palladium, and some other minerals that they use there, long-term good-paying jobs. That company has been there for decades providing good-paying jobs in South Carolina. So it is not just mining of these rare earth minerals. It is also the use of those minerals as well.

And I firmly believe that we have got to change the policies in this country to open up the Federal land and lessening the regulations and revamp the regs and laws that are keeping us from harvesting those resources and utilizing those and being so reliant on foreign sources of those resources. It is not just China, but it is very, very similar to oil and natural gas, where we are reliant on other countries to provide the needs here in this country.

So, Ms. Parthemore, I want to ask you. We heard from Mr. Johnson 13 million tons of rare earth minerals exist according to the Geological Survey. I believe it could be far more with that with new mining techniques.

What specific laws and Federal regulations does U.S. Congress and this administration need to repeal in your opinion or to allow businesses to access these natural resources and prevent the U.S. from being so dependent on China and other countries?

Ms. PARTHEMORE. Sir, I don't know of any specific laws or regulations that need to be repealed to open it up. Again, it varies greatly mineral by mineral of those that I have studied, our current history and our current predicament. There are none for which regulatory or legal issues are standing in the way.

One of the main things that we need to do in this country is be vigilant and watch for those. Keeping domestic jobs here and allowing these industries to bloom over time and changing laws and regulations if it is necessary to do that requires identifying the next rare earths and this type of issue in advance, years in advance, and making sure that those industries are created and maintained, get the research and development support from the government, potentially loan guarantees, things like that, well in advance of it hitting a crisis level, like we have with rare earths right now.

Mr. DUNCAN. Thank you very much.

When I was in business for myself, I realized real quickly that you could never hire somebody or pay someone to do something as cheaply as you could do it yourself. And I believe that buying rare earth minerals from other countries that are producing them, I believe we can do that cheaper here in America.

We can increase the tax base of working Americans' revenues to the country by putting more Americans to work in this and many, many other industries. And so I think this is a very timely issue.

I think Americans have common sense. And they understand that we have got the resources here, whether it is rare earth minerals or natural resources for energy production. And they scratch their head wondering why government policies continue to thwart efforts to be self-reliant in this country.

It is what made America great, was harvesting our natural resources and utilizes those in American companies and putting Americans to work. So I think it is an important issue, Mr. Chairman, and thank you for holding this hearing. I yield back.

Mr. MANZULLO. Without objection, we welcome Mr. Rohrabacher to the subcommittee. Mr. Rohrabacher, you are recognized for 5 minutes.

Mr. ROHRABACHER. Thank you very much, Mr. Chairman.

I am very interested in this, perhaps for survival purposes. If our country is to survive, we have got to be able to have those building blocks to modern society that will permit our people to have a decent standard of living.

I noticed when I was younger that the price of gasoline stayed about the same for a long period of time. I remember when I was a kid in the '50s, it was like 50 cents, actually 25 cents, a gallon. By the time I got into college, it was still right around 50 cents, 25–50 cents, a gallon. But the minute that the United States became a net importer of gasoline, rather than exporter of oil, the price of oil jumped drastically and had a major impact on the standard of living of the American people.

But what is worse, Mr. Chairman, an increase in the price of oil, that only the United States stood between this higher price and the lower price which was there for almost a decade, or that the people in the Third World's standard of living dramatically went down. I mean, to have the wealth sucked out of their country by a natural resource of oil that America now needs to import, rather than export, well, I am afraid the same can be true of just the very issue that we are looking at today with rare earth minerals, and I think China sees the type of leverage that it can have to squeeze wealth out of the rest of the world.

Those producers of oil back in the '60s saw that they could squeeze wealth out of the world by manipulating oil prices, so it behooves us as Americans and to the benefit of the rest of the world to see that this does not happen, that this control of rare earth minerals does not take place.

I would like to ask the panelists, do we know of instances similar to when China tried to pressure Japan in a policy dispute by using the cutoff of rare earth minerals, where China is trying to corral the control of these rare earth minerals in other parts of the world? Do you have any stories of that at all?

Mr. SMITH. I certainly don't have any stories about dictators, but there are certainly documented cases where different Chinese mining companies have tried to acquire the Molycorp assets here in the

United States as well as the Lynas assets in Western Australia, which are the two largest and richest ore bodies in the world.

All of those attempts have failed, which is the good news, but they are strategic in their thinking, and they are very disciplined.

Mr. ROHRABACHER. I am sure in the Third World they would just be paying off the local government officials. Thank God that they have been unsuccessful.

Mr. Chairman, we might look into, for example, legislation that might restrict the sale of this type of mineral wealth to corporations that were associated with, for example, dictatorships, China being the world's foremost human rights abuser and dictatorship.

I would think that would be very much against our national interest to permit companies that are really fronts for the People's Liberation Army from coming in and purchasing those mineral rights here in the United States.

So let me just add one note. I have also noticed in my career the demonization of people who are utilizing minerals in the United States for the betterment of our people, whether it is mining or whether it is the oil industry.

People who were utilizing these gifts, that we have from God, in order to put into our marketplace, which helped ordinary people's lives, had been demonized to the point that there are all sorts of political impediments to their ability to get that job done. I hope this panel today and your leadership will provide us a method of getting away from that demonization of people who are trying to do an efficient job of providing us with these resources.

Thank you very much, Mr. Chairman.

Mr. MANZULLO. Thank you.

In 2007, when Congress passed the Foreign Investment and National Security Act, I added an amendment stipulating that whenever the Committee on Foreign Investment in the U.S. is examining a potential sale and the buyer is a state-owned enterprise, it will be reviewed at the highest level so that something like this would not happen again.

Mr. ROHRABACHER. Thank you for your leadership, Mr. Chairman.

Mr. MANZULLO. I appreciate that.

I have a couple of questions. Mr. Faleomavaega brought up the issue of jobs, but it is not just the jobs that are associated with the mining and the manufacturing and the steps in between. Tell us about companies that have gone to China to set up operations because that is where the rare earths are and what China does to woo those American companies to leave here.

Mr. GALYEN. I will take a stab at it, Mr. Chairman. For us, we haven't seen it directly. We have operations and production in China, but our intent, as I commented earlier—we produce in Florida. And we produce the residential compressors I was talking about in Arkansas. And we manufacture power electronics in Rockford.

I think the risk becomes stronger if the supply of this needed material, as we have talked, is only available in China. Then my options are going to be such that if I want to play in the market, then I must go to China and be in China to get those materials.

And that is where I think you could actually see a movement of jobs and production and investment to China.

Mr. MANZULLO. Do you know of any anecdotal stories of where this actually happened or is that just a sore that is hanging out there that you can see dangling?

Mr. GALYEN. I asked some questions of my colleagues. And I said, "I don't have any evidence of it actually moving," but we do track the prices in China and out of China. And there is a gap today. There is also very clearly the statements that they are going to establish quotas and given a priority to their domestic supply.

Mr. MANZULLO. Yes.

Mr. GALYEN. So in both of those cases, I think they are sending us the signal that they would like to have the jobs, they would like to have the technology, and they would like to have the investment in China.

Mr. MANZULLO. They are setting the stage.

Mr. GALYEN. And, to be honest, Mr. Duncan's comments, I think did they see the opportunity? Yes. I think they have seen the opportunity and for a long time.

Mr. MANZULLO. I would like to shift just a little bit. We are talking about additional mining and processing to come up with these permanent magnets. Mr. Smith, talk to us about the terbium that is found in fluorescent lights and what your company has done to recycle those and the possible uses of terbium.

Mr. SMITH. We are looking at the recycling of the rare earth elements from the compact fluorescent light bulbs. Those light bulbs have been on the market for about 10 years now. So the useful life is starting to come to an end. And there is a real need to recycle these materials.

There are only about 200 tons of terbium that are required worldwide every year. So a very simple process of recycling the terbium from those compact fluorescent light bulbs year after year now can actually do a major piece of good to the supply situation in terms of making sure terbium is available.

The other advantage that terbium offers, particularly in the magnetic market, is that terbium will also increase the temperature capacity of the neodymium iron boron magnets, which only need about one-third to one-half of that amount of material versus dysprosium.

So there are a lot of win-win situations here by taking advantage of what we think are existing resources of materials by just simply recycling these items.

Mr. MANZULLO. We discussed in our office this morning about contacting GSA on using the fluorescents that are in public buildings.

There is technology that is available to do this. There is a French company that does this that is looking to set up operations in this country. There is obviously room for more than one company——

Mr. SMITH. Right.

Mr. MANZULLO [continuing]. Based upon the amount of fluorescents.

If GSA decided to start a program to take fluorescent bulbs and put them into a facility to recycle, what impact would that have?

Mr. SMITH. We do not have exact numbers on that, Mr. Chairman, but I will speculate that it will have a major impact on our ability to supply the terbium market across the board and probably provide additional uses for terbium that we don't have today because there isn't enough supply.

Mr. MANZULLO. It is not just recapturing terbium. It is recapturing——

Mr. SMITH. Europium and yttrium as well.

Mr. MANZULLO. And then those can be recycled again for lighting?

Mr. SMITH. Absolutely.

Mr. MANZULLO. Is that correct?

Mr. SMITH. That is correct.

Mr. MANZULLO. Mr. Faleomavaega, did you have any other questions you want to ask?

Mr. FALEOMAVAEGA. If I could? Thank you, Mr. Chairman.

For our second round, I wanted to ask Ms. Parthemore. I sense that you have an extensive understanding about implications of foreign policy and our national security interests concerning this issue.

What is your estimate of the dollar value that we place on rare earths as far as our military industry complex is concerned? I mean, with a $760 billion budget that we have in our defense, how much of that goes into rare earths in terms of building our aircraft, our electronic system, and all of that? Do you have any estimates on that?

Ms. PARTHEMORE. No, sir. And the challenge is that no one knows. The Department of Defense's biggest problem by my estimate is that it does not fully understand, despite years and instruction by Congress, to really study its supply chains and quantify how, when, where, and in what quantities it relies on different valuable earths. I don't think the Department is anywhere near having a good estimate of——

Mr. FALEOMAVAEGA. Let me say this for the record. Are you saying that we do not know in the Defense Department how much we are spending for these rare earth materials that we need for our aircraft, missile defense system, and all of this?

Ms. PARTHEMORE. It is my estimate that that is the case, correct. Again, so there are contractors. There are private companies that supply the Department of Defense that may have a good estimate of what they need for their own supplies and assets that they are providing to DoD.

But they don't always share that information with the Department of Defense, even upon request. I have seen more willingness over the past year or 2 than previously to share that information with DoD given the current crisis and concerns over shortages.

But no, I don't think that there is a single good overall estimate. If there is, that is wonderful. But I don't know of it.

Mr. MANZULLO. With China now controlling 95 to 97 percent of the rare earths, as we have discussed this afternoon, what are the implications in terms of our national security?

What level of risk are we putting on our national security because of the fact that China controls 95 percent? What is the reaction time? Do we need, do we really critically need, these elements as part of our national defense? I mean, not just building tanks and bullets and airplanes, but where does it really come in when it is really critical?

I don't know if I am asking the right question here.

Ms. PARTHEMORE. No. It is a good question.

My biggest concern is political leverage. So for China, in addition to other exporting countries that know that they have control over a market that is strategically important to other countries, they will use that for political leverage.

It has happened before the case of—in cases with uranium and other mineral supplies historically from countries like Kazakhstan, Chile, other places. And, again, I think that it was predictable that China once it gained control over this system was going to use that for political leverage in examples like with the trawler captain issue with Japan last year, some of its other geopolitical challenges and tensions and fights with other countries. It is going to add this into the mix as one more thing in which it has control over this situation and can exert that leverage into negotiations.

Mr. FALEOMAVAEGA. What is your estimate in terms of how many years would it take us to catch up with China concerning this industry? Mr. Smith, Mr. Strahs, we have what it takes, but I am just curious. How long will it take us to catch up with China in that regard?

Ms. PARTHEMORE. Sir, I am hoping not long given that Mountain Pass was a productive mine before. And, from what I have learned from industry counterparts, that goes a long way toward speeding up the process of getting production up and running domestically. So that is a good thing.

Part of it, though, anything that we can do to reduce that control over the market, even if we are not displacing 75 percent or 50 percent of Chinese production and supplies to the market of rare earths, anything to do to just change that percentage in the favor of them not having almost full control is going to start to diminish the political leverage that they see in this situation.

So anything we can do in this country will help, but it is sort of the more, the better, the faster, the better off we are going to be.

Mr. FALEOMAVAEGA. Is uranium considered a rare element?

Mr. SMITH. No, sir. No, it is not.

Mr. FALEOMAVAEGA. But we need it for nuclear——

Mr. SMITH. Correct.

Mr. FALEOMAVAEGA [continuing]. Nuclear bomb development or nuclear reactors that Japan has decided not to get into. The reason why I raised the issue is the fact that Australia I think has about 25 percent of the market in uranium. And Kazakhstan also has about another 25 percent control of the market.

What is our percentage control of uranium? Does anybody know? Maybe I am asking the wrong question here.

Mr. SMITH. I don't know. I am in the rare earths business.

Mr. FALEOMAVAEGA. All right. Let's stay with the rare earths.

Mr. SMITH. Okay.

Mr. FALEOMAVAEGA. As, Mr. Smith, I think, you have alluded earlier that you are not having any problem with the regulations. So with these Federal agency bureaucracies that pound on you saying that you have got to fulfill your permits, it has been no problem?

Mr. SMITH. Well, I wouldn't ever say that it is not a problem or that it doesn't take a long time to get them, but we have all of our permits in place and some good advance timing and some collaborative efforts have made a difference.

Mr. FALEOMAVAEGA. EPA is not giving you a hard time on this?

Mr. SMITH. No, sir.

Mr. FALEOMAVAEGA. Oh, that is interesting.

Thank you, Mr. Chairman. I thank the panel for their testimony, appreciate your coming.

Mr. SMITH. Thank you.

Mr. MANZULLO. Mr. Johnson?

Mr. JOHNSON. Thank you, Mr. Chairman.

Mr. Smith, one of the recommendations you offer is to support private sector efforts to recycle rare earths. How effective would such a process be?

Mr. SMITH. Right now under a voluntary program, it is not very effective. The numbers that we are hearing are that we have less than 5 percent of the used compact fluorescent light bulbs being recycled today, which means that 95 percent of them are being thrown away into landfills, which is also not a good practice.

So it is our opinion that we can have a major impact on certain heavy rare earth elements, such as yttrium, europium, and terbium if we get the idea of recycling across to the American public in a much bigger way than what it is today.

Mr. JOHNSON. Is it generally more cost-effective to recycle rare earth elements than to mine new ones?

Mr. SMITH. Historically the answer has been a very simple absolutely not, but with prices for these rare earth elements where they are today, recycling has become a very, very important consideration by almost everybody that uses these minerals.

Mr. JOHNSON. Ms. Parthemore, in September of last year, China placed an embargo on rare earth exports to Japan after a diplomatic dispute. How likely is it in your opinion that China would use a similar foreign policy strategy with the U.S.?

Ms. PARTHEMORE. For the United States, it depends on the circumstances. In general, speaking in regards to China and, again, any exporting country that has full control over a market like this will use it again and again for political advantage when they see that the circumstances are there, I think 100 percent. They absolutely would, as we would as well. I think it is just the logical thing to do when you have possessed this type of economic control that allows you political and strategic leverage.

Mr. JOHNSON. Besides Japan, has China used its rare earth monopoly as leverage with other nations to date or threatened to do so, as far as you know, other than Japan?

Ms. PARTHEMORE. Sir, not that I know of. From a trans-perspective as well, it is—I think there are partial truths in all of those, but it is also trying to address its own environmental concerns and the potential for its environmental practices, which have been unregulated within China, to drive social instability, which is an extraordinarily major concern for the Chinese Government.

So, again, I think they have a lot of domestic issues that are attaching to this. It is not just how they are using these within the foreign policy arena. It all connects together, though.

Mr. JOHNSON. Probably an easily answered question here, but in your opinion, would a disruption in the supply chain of rare earths have a serious negative implication, hinder, or harm our national defense and foreign policy objectives?

Ms. PARTHEMORE. Yes, sir, I do.

Mr. JOHNSON. Okay. Mr. Chairman, I think that is all the questions I have. Thank you very much.

Mr. MANZULLO. Mr. Duncan?

Mr. DUNCAN. Thank you, Mr. Chairman. Thank the panelists for sitting through another round of questioning. And I want to thank Mr. Smith.

I was talking about jobs earlier. I had not read your testimony. And being tied up when you gave it, I didn't realize a lot of the points I was making you had made as well. It is all about jobs. And I appreciate your perspective on this.

In your testimony, you talk about China's former premier, Deng Xiaoping, who famously commented in 1992, "Middle East has oil. China has rare earths," that China recognized this key advantage 20 years ago and, ever since, has focused intently on rare earths production as a job creation engine. Hello? Jobs for America.

But you mentioned another critical trend that we are witnessing as China's efforts to exercise much tighter control over its internal production and that it has settled in the pace of the internal consumption of these rare earth minerals and rapidly resulting in rapid constriction of its exports. What are they using? If they are using more and more of the rare earths internally, what are they using those rare earth minerals for?

Mr. SMITH. There are two different areas that we look at in terms of what they are using these minerals for. One is they are making more and more end-use products: The MRI machines, the motors, the cars, the wind turbines. They are actually making those products and exporting them to the rest of the world.

The other item, though, is that they are trying to increase their standard of living. And their 1.3 billion citizens would also like to have computers and cell phones and iPads and iPhones. So we are seeing a real doubling-up, so to speak, of China's demand because they are trying to produce more end-use products for the rest of the world as well as these end-use products for their own citizens.

Mr. DUNCAN. So if the U.S. were able to mine its own rare earths and create products here that were in demand in China, there would be an export possibility of U.S.-made goods to China using U.S. rare earths?

Mr. SMITH. We don't see any reason why that can't be done with good technology.

Mr. DUNCAN. Okay. Well, thank you.

A lot of other questions, Mr. Chairman, were asked by Mr. Faleomavaega. So I will yield back the balance of my time. Thank you.

Mr. MANZULLO. I have a couple more questions. In what you are doing, Mr. Smith, the mining, extraction, alloying, oxidizing, and then going into making the metal itself, you are, what, four-fifths of the way through? Is that correct?

Mr. SMITH. Yes. We look at the supply chain from mine to magnets and suggest that there are five steps in that process.

Mr. MANZULLO. Did I leave out a step?

Mr. SMITH. Well, the fifth step is the actual production of magnets.

Mr. MANZULLO. You mean the actual magnets?

Mr. SMITH. Yes. We certainly have the first four. And we have all of those capabilities in Molycorp today.

Mr. MANZULLO. So, then, your business plan is to manufacture the neodymium?

Mr. SMITH. The neodymium, the neodymium metal, the neodymium iron boron alloy. And ultimately we plan to be in a joint venture magnet production effort as well.

Mr. MANZULLO. Mr. Strahs, you are presently manufacturing the samarium cobalt and also lower-end ferrite magnets. Is that correct?

Mr. STRAHS. Yes, we do.

Mr. MANZULLO. Your business plan, for lack of a better word, is to manufacture the neodymium. Is that correct?

Mr. STRAHS. We would like to be able to manufacture, yes, neodymium iron boron magnets.

Mr. MANZULLO. Mr. Galyen says the more manufacturers of this the better because there are a lot of uses for it out there.

I noticed you had mentioned this, Mr. Smith, that the Chinese are developing more and more uses for the permanent magnets in the development of more and more consumer products.

Mr. SMITH. Correct.

Mr. MANZULLO. And that is where the jobs are.

Mr. SMITH. That is correct.

Mr. MANZULLO. Go ahead.

Mr. SMITH. From what we have seen, the further you get into the supply chain, the higher level of employment.

Mr. MANZULLO. Do you believe that if these and the permanent magnets are more available in the United States they could help keep jobs here or actually create jobs in areas to manufacture new products that have to use these elements?

Mr. SMITH. There is no question in my mind. The answer is yes, it will.

Mr. MANZULLO. Okay. Well, we are supposed to have votes at 2:45. Let me introduce to you Ken Reiman. Ken is on loan to us from the State Department. He is a fellow. We have been blessed to have him. He is working full-time on this rare earth issue.

What we have been doing for about the past 4 or 5 months is meeting with every conceivable player that we know is involved in rare earths, including people in the government. We have met with people from State. We will be meeting with people from DoD. We have obviously met with people from the Department of Energy.

We have been trying to piece together this whole picture as to exactly what it means for the United States not to be able to manufacture these high-end magnets.

It is amazing to me. I know DoD is looking at it, but, for goodness gracious sake, the guidance system of missiles depends upon us importing these neodymium iron boron magnets from China.

I would think that they are probably used in the drones. Would that be correct?

Mr. SMITH. That would be correct.

Mr. MANZULLO. So we are making more uses of these permanent magnets in our own defense systems. I just don't see DoD really stepping up.

The last question is, should rare earths be classified here, as it is abroad in Europe and Japan, as a strategic resource? The Japanese refer to rare earths as "the seeds of high technology." Should we be stockpiling rare earths, as our partners around the world are doing, in preparation for future disruptions, especially in the area of military defense? Anybody?

Ms. PARTHEMORE. Yes, sir. I definitely think so. The National Academies put out a report a few years ago recommending hundreds of pages of material on just how to update the stockpiling policy.

So DoD going further and just implementing these ideas that have been floating around for years I think would benefit our understanding of our defense supply chains and make sure that rare earths and any other minerals that can be classified as being this important and potentially leading to crises such as this, we can be vigilant and watch for it and prevent it from happening again.

Mr. MANZULLO. You testified earlier that you don't believe that the Department of Defense is quite on top of this. I am not trying to be critical of anybody here because we are trying to piece together all the resources and go forward.

Is that the statement you made earlier? I don't want to mischaracterize your statement.

Ms. PARTHEMORE. No. It is correct. It is less the fault of anyone in DoD necessarily but just the fact that defense assets are now relying on global supply chains more than they ever were before. And defense assets are becoming more dual use in terms of civilian and military technologies.

So telecommunications equipment, for example, obviously has a lot of civilian use as well as military components to what it is doing. So the supply chains for all of these are not just a distinct defense supply chain, as it once was.

It is privatized. It is globalized. And a lot of these things, such as using iPods for translations devices abroad, things like that, mean that the supply chains are significantly more complex than they used to be. It is just going to take a lot of effort to fully understand how one mineral ties into——

Mr. MANZULLO. It doesn't take much examination of the supply chain for neodymium iron boron to realize it is all coming from China. I would have thought somewhere along the line that somebody at the Pentagon would have said, "There is a problem, Houston."

Ms. PARTHEMORE. Yes. I think that there is one manufacturer in Pennsylvania of those magnets I believe is the case. One may not be enough, especially if anything were to happen to that one. But it is definitely problematic.

Mr. MANZULLO. Even in the neodymium? I would think that any of those——

Mr. STRAHS. No, there are no producers of neodymium iron boron magnets today in the U.S. There are two producers of samarium cobalt magnets——

Mr. MANZULLO. Right.

Mr. STRAHS [continuing]. Ourselves and the company in——

Mr. MANZULLO. But nobody is producing neodymium here?

Mr. STRAHS. Correct.

Mr. MANZULLO. Well, I want to thank you all for coming. It has been a very interesting panel. We are still looking for more information. The reason I introduced Ken is that he is going to continue to work on this until we sharpen our focus even more and make some priorities. We are very much interested. One initiative we think we can help implement right away is the recycling of rare earths.

It is a win-win for everybody. I don't see who would be opposed to it. So, we are going to contact GSA and even perhaps House Administration here in the House of Representatives to see if we can get involved in helping to recapture the rare earths from the tombs.

Thank you for coming. This subcommittee is adjourned.

[Whereupon, at 2:41 p.m., the subcommittee was adjourned.]

APPENDIX

MATERIAL SUBMITTED FOR THE HEARING RECORD

SUBCOMMITTEE HEARING NOTICE
COMMITTEE ON FOREIGN AFFAIRS
U.S. HOUSE OF REPRESENTATIVES
WASHINGTON, D.C.

Subcommittee on Asia and the Pacific
Donald A. Manzullo (R-IL), Chairman

September 16, 2011

You are respectfully requested to attend an OPEN hearing of the Committee on Foreign Affairs, Subcommittee on Asia and the Pacific, to be held in **Room 2172 of the Rayburn House Office Building (and available live, via the WEBCAST link on the Committee website at http://www.hcfa.house.gov)**:

DATE: Wednesday, September 21, 2011

TIME: 1:00 p.m.

SUBJECT: China's Monopoly on Rare Earths: Implications for U.S. Foreign and Security Policy

WITNESSES:
Mr. Mark A. Smith
President and Chief Executive Officer
Molycorp Minerals

Mr. Robert Strahs
Vice President and General Manager
Arnold Magnetic Technologies, North America

Mr. John Galyen
President
Danfoss North America

Ms. Christine Parthemore
Fellow
Center for a New American Security

By Direction of the Chairman

The Committee on Foreign Affairs seeks to make its facilities accessible to persons with disabilities. If you are in need of special accommodations, please call 202/225-5021 at least four business days in advance of the event, whenever practicable. Questions with regard to special accommodations in general (including availability of Committee materials in alternative formats and assistive listening devices) may be directed to the Committee.

COMMITTEE ON FOREIGN AFFAIRS

MINUTES OF SUBCOMMITTEE ON *Asia and the Pacific* HEARING

Day *Wednesday* Date *September 21* Room *2172 Rayburn HOB*

Starting Time *1:02 p.m.* Ending Time *2:41 p.m.*

Recesses *0* (___to___) (___to___) (___to___) (___to___) (___to___) (___to___)

Presiding Member(s)

Chairman Donald Manzullo

Check all of the following that apply:

Open Session ☑
Executive (closed) Session ☐
Televised ☐

Electronically Recorded (taped) ☑
Stenographic Record ☑

TITLE OF HEARING:

"China's Monopoly on Rare Earths: Implications for U.S. Foreign and Security Policy"

SUBCOMMITTEE MEMBERS PRESENT:

Donald Manzullo, Eni Faleomavaega, Brad Sherman, Bill Johnson, Jeff Duncan

---

NON-SUBCOMMITTEE MEMBERS PRESENT: *(Mark with an * if they are not members of full committee.)*

Jerry Lewis, Dana Rohrabacher*

HEARING WITNESSES: Same as meeting notice attached? Yes ☑ No ☐
(If "no", please list below and include title, agency, department, or organization.)

STATEMENTS FOR THE RECORD: *(List any statements submitted for the record.)*

1. Chairman Manzullo - Opening statement
  - Statement from Grundfos Corporation
2. Ranking Member Faleomavaega - Statement for the record
  - New York Times article
  - Islands Business article
  - Chart depicting U.S. import reliance for select materials
3. Prepared testimony of witnesses: Mark A. Smith, Robert Strahs, John Galyen, Christine Parthemore

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TIME SCHEDULED TO RECONVENE ______
or
TIME ADJOURNED *2:41*

Subcommittee Staff Director

MATERIAL SUBMITTED FOR THE RECORD BY THE HONORABLE DONALD A. MANZULLO, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS, AND CHAIRMAN, SUBCOMMITTEE ON ASIA AND THE PACIFIC

GRUNDFOS®

Statement for the Record by Grundfos

Before the House of Representatives Committee on Foreign Affairs, Subcommittee on Asia and the Pacific

September 21, 2011

Dear Chairman Manzullo and Ranking Member Faleomavaega,

Grundfos is pleased to submit the following statement for the record in connection with the subcommittee's hearing on "China's Monopoly on Rare Earths: Implications for U.S. Foreign and Security Policy."

Grundfos is the world's leading pump manufacturer with an annual production of more than 16 million units. Our products include circulator pumps for heating and air-conditioning as well as centrifugal pumps for rural and municipal water supply, wastewater treatment and industrial production. We employ more than 17,900 people worldwide, including 1,500 in our U.S. facilities in California, Illinois, Indiana, Kansas, Pennsylvania, and Texas.

As a global industry leader, Grundfos seeks growth through innovation. We invest 6% of annual revenue in research and development, and we are currently developing several new technology centers in the United States, including a Water Technology Center in Fresno, California and a Global Competency Center for Commercial Buildings in Brookshire, Texas.

Grundfos is committed to the principles of open markets and free trade. We are concerned that trade barriers could inhibit the development of new energy-efficient technologies in the pump sector.

Pumps account for 10 percent of the world's electricity use. Grundfos is developing new technology that could reduce this figure to 4-5 percent, assuming universal adoption of high-efficiency pump systems. These energy savings will go a long way in boosting energy security, industrial competitiveness and the sustainability of urban and rural development.

The potential for energy savings in the pump sector lies primarily in domestic and commercial buildings, industrial applications, wastewater treatment and transportation as well as the rapidly growing water reuse industry. Grundfos produces high-efficiency pumps for all of these sectors. One of the key raw materials that we depend on is the rare earth neodymium, which is used to produce high-powered magnets for our most advanced pumps.

We believe that current Chinese policies distort the global market for rare earths. Due to Chinese taxes and export controls, the price of neodymium increased more than tenfold between the fall of 2009 and the spring of 2011, and the price of neodymium-based high-powered magnets has increased fourfold during the last six months. Such price instability could threaten the development and production of a wide range of energy efficient products outside China in the immediate future. We estimate that it will take at least 3-5 years to develop a sufficient supply of rare earths outside China to ensure relative price stability.

In conclusion, Grundfos would welcome action by the U.S. government to facilitate more transparent Chinese policies in accordance with the established rules and principles of the international trade system.

We appreciate the opportunity to submit this statement for the record, and we applaud the subcommittee for its work on this important issue.

For further information, please contact:

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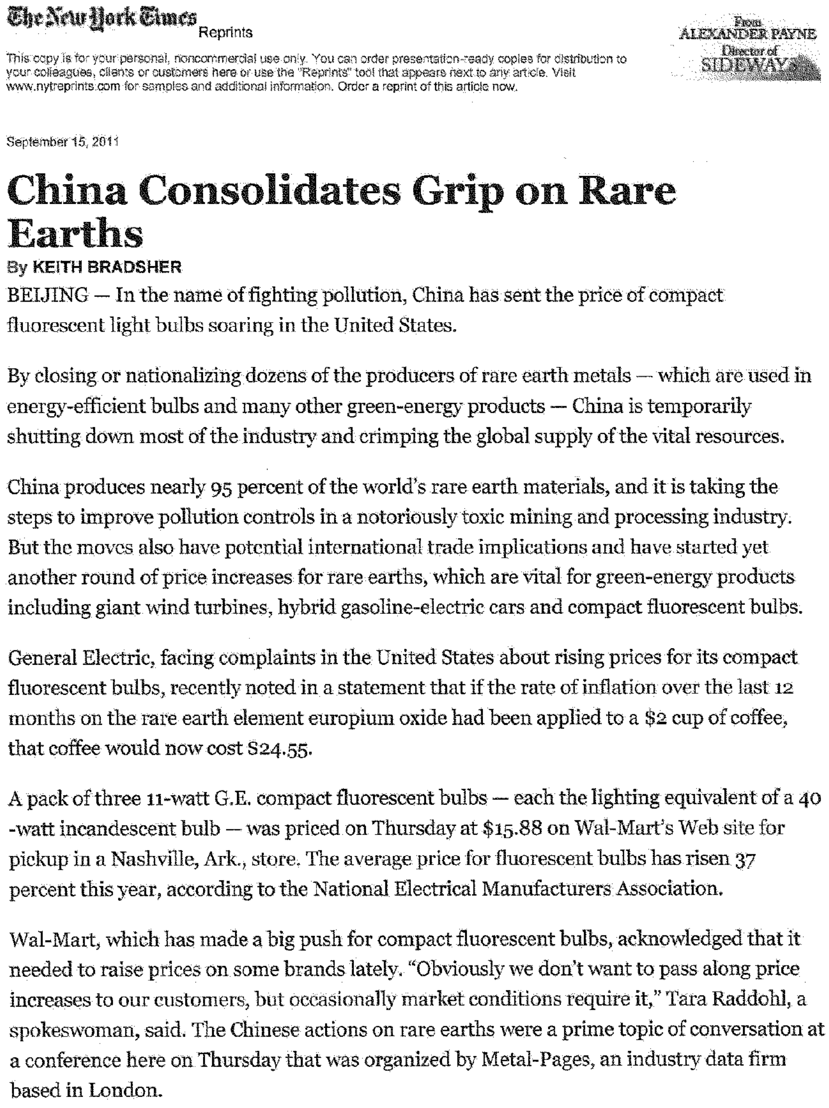
MATERIAL SUBMITTED FOR THE RECORD BY THE HONORABLE ENI F.H. FALEOMAVAEGA, A REPRESENTATIVE IN CONGRESS FROM AMERICAN SAMOA



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From
ALEXANDER PAYNE
Director of
SIDEWAYS

September 15, 2011

China Consolidates Grip on Rare Earths

By KEITH BRADSHER

BEIJING — In the name of fighting pollution, China has sent the price of compact fluorescent light bulbs soaring in the United States.

By closing or nationalizing dozens of the producers of rare earth metals — which are used in energy-efficient bulbs and many other green-energy products — China is temporarily shutting down most of the industry and crimping the global supply of the vital resources.

China produces nearly 95 percent of the world's rare earth materials, and it is taking the steps to improve pollution controls in a notoriously toxic mining and processing industry. But the moves also have potential international trade implications and have started yet another round of price increases for rare earths, which are vital for green-energy products including giant wind turbines, hybrid gasoline-electric cars and compact fluorescent bulbs.

General Electric, facing complaints in the United States about rising prices for its compact fluorescent bulbs, recently noted in a statement that if the rate of inflation over the last 12 months on the rare earth element europium oxide had been applied to a $2 cup of coffee, that coffee would now cost $24.55.

A pack of three 11-watt G.E. compact fluorescent bulbs — each the lighting equivalent of a 40-watt incandescent bulb — was priced on Thursday at $15.88 on Wal-Mart's Web site for pickup in a Nashville, Ark., store. The average price for fluorescent bulbs has risen 37 percent this year, according to the National Electrical Manufacturers Association.

Wal-Mart, which has made a big push for compact fluorescent bulbs, acknowledged that it needed to raise prices on some brands lately. "Obviously we don't want to pass along price increases to our customers, but occasionally market conditions require it," Tara Raddohl, a spokeswoman, said. The Chinese actions on rare earths were a prime topic of conversation at a conference here on Thursday that was organized by Metal-Pages, an industry data firm based in London.

Soaring prices are rippling through a long list of industries.

"The high cost of rare earths is having a significant chilling effect on wind turbine and electric motor production in spite of offsetting government subsidies for green tech products," said one of the conference attendees, Michael N. Silver, chairman and chief executive of American Elements, a chemical company based in Los Angeles. It supplies rare earths and other high-tech materials to businesses.

But with light bulbs, especially, the timing of the latest price increases is politically awkward for the lighting industry and for environmentalists who backed a shift to energy-efficient lighting.

In January, legislation that President George W. Bush signed into law in 2007 will begin phasing out traditional incandescent bulbs in favor of spiral compact fluorescent bulbs and other technologies. The European Union has also mandated a switch from incandescent bulbs to energy-efficient lighting.

Representative Michele Bachmann of Minnesota is running for the Republican presidential nomination on a platform that includes strong opposition to the new lighting rules in the United States and has been a leader of efforts by House Republicans to repeal it.

China says it has largely shut down its rare earth industry for three months to address pollution problems. By invoking environmental concerns, China could potentially try to circumvent international trade rules that are supposed to prohibit export restrictions of vital materials.

In July, the European Union said in a statement on rare earth policy that the organization supported efforts to protect the environment, but that discrimination against foreign buyers of rare earths was not allowed under World Trade Organization rules.

China has been imposing tariffs and quotas on its rare earth exports for several years, curtailing global supplies and forcing prices to rise eightfold to fortyfold during that period for the various 17 rare earth elements.

Even before this latest move by China, the United States and the European Union were preparing to file a case at the W.T.O. this winter that would challenge Chinese export taxes and export quotas on rare earths.

Chinese officials here at the conference said the government was worried about polluted water, polluted air and radioactive residues from the rare earth industry, particularly among many small and private companies, some of which operate without the proper licenses.

While rare earths themselves are not radioactive, they are always found in ore containing radioactive thorium and require careful handling and processing to avoid contaminating the environment.

Most of the country's rare earth factories have been closed since early August, including those under government control, to allow for installation of pollution control equipment that must be in place by Oct. 1, executives and regulators said.

The government is determined to clean up the industry, said Xu Xu, chairman of the China Chamber of Commerce of Metals, Minerals and Chemicals Importers and Exporters, a government-controlled group that oversees the rare earth industry. "The entrepreneurs don't care about environmental problems, don't care about labor problems and don't care about their social responsibility," he said. "And now we have to educate them."

Beijing authorities are creating a single government-controlled monopoly, Bao Gang Rare Earth, to mine and process ore in northern China, the region that accounts for two-thirds of China's output. The government is ordering 31 mostly private rare earth processing companies to close this year in that region and is forcing four other companies into mergers with Bao Gang, said Li Zhong, the vice general manager of Bao Gang Rare Earth.

The government also plans to consolidate 80 percent of the production from southern China, which produces the rest of China's rare earths, into three companies within the next year or two, Mr. Li said. All three of these companies are former ministries of the Chinese government that were spun out as corporations, and the central government still owns most of the shares.

The taxes and quotas China had in place to restrict rare earth exports caused many companies to move their factories to China from the United States and Europe so that they could secure a reliable and inexpensive source of raw materials.

China promised when it joined the W.T.O. in 2001 that it would not restrict exports except for a handful of obscure materials. Rare earths were not among the exceptions.

But even if the W.T.O. orders China to dismantle its export tariffs and quotas, the industry consolidation now under way could enable China to retain tight control over exports and continue to put pressure on foreign companies to relocate to China.

The four state-owned companies might limit sales to foreign buyers, a tactic that would be hard to address through the W.T.O., Western trade officials said.

Hedge funds and other speculators have been buying and hoarding rare earths this year, with prices rising particularly quickly through early August, and dipping since then as some have sold their inventories to take profits, said Constantine Karayannopoulos, the chief executive of Neo Material Technologies, a Canadian company that is one of the largest processors in China of raw rare earths.

"The real hot money got into the industry building neodymium and europium inventories in Shanghai warehouses," he said.

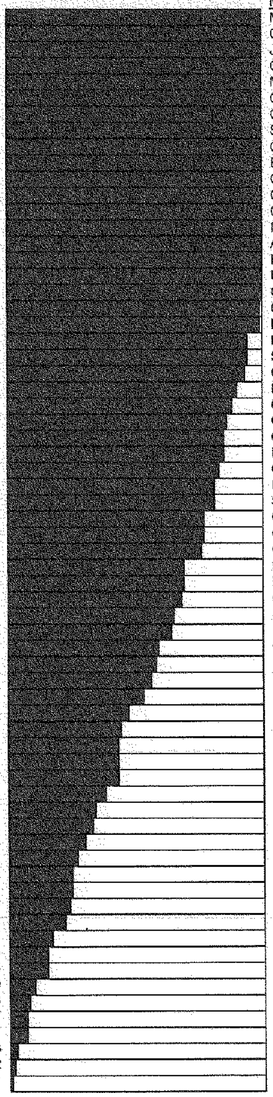
Stephanie Clifford contributed reporting from New York.

This article has been revised to reflect the following correction:

Correction: September 17, 2011

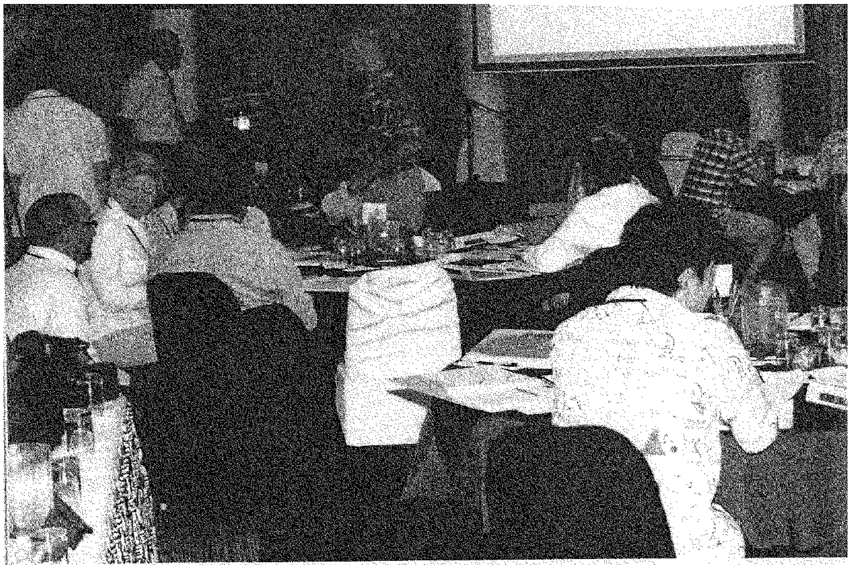
An article on Friday about the effect of China's control over rare earth metals on energy-efficient products like light bulbs misstated the price of 11-watt G.E. compact fluorescent bulbs listed on Wal-Mart's Web site. The price of $15.88 is for a three-pack, not a single bulb.

2010 U.S. NET IMPORT RELIANCE FOR SELECTED NONFUEL MINERAL MATERIALS



Commodity	Percent	Major Import Sources (2006-09)[1]
ARSENIC (trioxide)	100	Morocco, China, Belgium
ASBESTOS	100	Canada
BAUXITE and ALUMINA	100	Jamaica, Brazil, Guinea, Australia
CESIUM	100	Canada
FLUORSPAR	100	Mexico, China, South Africa, Mongolia
GRAPHITE (natural)	100	China, Mexico, Canada, Brazil
INDIUM	100	China, Canada, Japan, Belgium
MANGANESE	100	South Africa, Gabon, China, Australia
MICA, sheet (natural)	100	China, Brazil, Belgium, India
NIOBIUM (columbium)	100	Brazil, Canada, Germany, Estonia
QUARTZ CRYSTAL (industrial)	100	China, Japan, Russia
RARE EARTHS	100	China, France, Japan, Austria
RUBIDIUM	100	Canada
STRONTIUM	100	Mexico, Germany
TANTALUM	100	Australia, China, Kazakhstan, Germany
THALLIUM	100	Russia, Germany, Netherlands
THORIUM	100	United Kingdom, France, India, Canada
YTTRIUM	100	China, Japan, France
GALLIUM	99	Germany, Canada, China, Ukraine
GEMSTONES	99	Israel, India, Belgium, South Africa
BISMUTH	94	Belgium, China, United Kingdom, Mexico
PLATINUM	94	South Africa, Germany, United Kingdom, Canada
ANTIMONY	93	China, Mexico, Belgium
GERMANIUM	90	Belgium, China, Russia, Germany
IODINE	88	Chile, Japan
RHENIUM	86	Chile, Netherlands
DIAMOND (dust, grit and powder)	85	China, Ireland, Russia, Republic of Korea
STONE (dimension)	85	Brazil, China, Italy, Turkey
POTASH	83	Canada, Belarus, Russia
COBALT	81	Norway, Russia, China, Canada
TITANIUM MINERAL CONCENTRATES	81	South Africa, Australia, Canada, Mozambique
SILICON CARBIDE	77	China, Venezuela, Netherlands, Romania
ZINC	77	Canada, Peru, Mexico, Ireland
BARITE	76	China, India
TIN	69	Peru, Bolivia, China, Indonesia
VANADIUM	69	Rep. of Korea, Czech Republic, Canada, Austria
TUNGSTEN	68	China, Canada, Germany, Bolivia
SILVER	65	Mexico, Canada, Peru, Chile
TITANIUM (sponge)	64	Kazakhstan, Japan, Ukraine, Russia
PEAT	59	Canada
PALLADIUM	58	Russia, South Africa, United Kingdom, Belgium
CHROMIUM	56	South Africa, Kazakhstan, Russia, China
MAGNESIUM COMPOUNDS	53	China, Austria, Canada, Brazil
BERYLLIUM	47	Kazakhstan, Kenya, Germany, Ireland
SILICON (ferrosilicon)	44	China, Russia. Venezuela, Canada
LITHIUM	43	Chile, Argentina, China
NICKEL	43	Canada, Russia, Australia, Norway
NITROGEN (fixed), AMMONIA	43	Trinidad and Tobago, Russia, Canada, Ukraine
ALUMINUM	38	Canada, Russia, China, Mexico
MAGNESIUM METAL	34	Canada, Israel, China, Russia
GOLD	33	Canada, Mexico, Peru, Chile
COPPER	30	Chile, Canada, Peru, Mexico
MICA, scrap and flake (natural)	27	Canada, China, India, Finland
GARNET (industrial)	25	India. Australia, China, Canada
PERLITE	25	Greece
SALT	24	Canada, Chile, Mexico, The Bahamas
VERMICULITE	22	China, South Africa
SULFUR	17	Canada, Mexico, Venezuela
GYPSUM	15	Canada, Mexico, Spain
PHOSPHATE ROCK	15	Morocco
IRON and STEEL SLAG	10	Japan, Canada, Italy, South Africa
CEMENT	8	China, Canada, Republic of Korea, Taiwan
IRON and STEEL	7	Canada, European Union, China, Mexico
PUMICE	7	Greece, Turkey, Iceland, Mexico
DIAMOND (natural industrial stone)	3	Botswana, South Africa, Namibia, India
LIME	2	Canada, Mexico
STONE (crushed)	1	Canada, Mexico, The Bahamas

[1] In descending order of import share.



Gathering momentum...Regional officials in Nadi last month discussing issues relating to deep sea mining in the Pacific. The meeting was organised by SOPAC. ***Photo: SOPAC***

Treasures of

Real interest in mining the

By Dionisia Tabureguci

Whether or not someone is hoarding a big chunk of the world's metals supply, the seemingly insatiable global appetite for them and the subsequent speculation-inflated prices in the major markets may very well drive a number of small idyllic islands countries in the Pacific into becoming mining centers overnight.

It's a scenario, some believe, is already within sight.

These days, mining the mysterious dark reaches of the ocean's sea floor for minerals is no longer something in the realm of science fiction.

The demand, the high prices, the typical high-grade nature of the deposits found in the deep, the wonders of new technologies and the recognised depletion of land-based minerals sources from which these metals are derived are all combining to make seabed mining economically feasible.

And the interest in these small Pacific countries, most with ocean spaces bigger than their total landmass, is now very real.

Take Cook Islands for example. It may be a group of 15 small islands with a total landmass of around 240 square kilometres and a population of roughly 14,000 people at last census count. But the waters of its Exclusive Economic Zone (EEZ) is said to hold untold riches that have the potential to push this tiny nation from pearl and tourism-dependent to one associated with mining income, possibly as a significant supplier of cobalt.

Pristine as it may be, Cook Islands' EEZ is host to "approximately

the deep

Pacific's seabed

7.5 billion dry tonnes of cobalt rich manganese nodules containing 32.5 million tonnes of cobalt, 24.5 million tonnes of nickel and 14 million tonnes of copper (cut-off grade of >5kg/cubic metre) in an area of 652 223 sq kilometres," according to a feasibility study done for the Cook Islands in 1999 by scientists Ben Ponia, who is now the chairman of the Cook Islands Seabed Minerals Committee, and Malcolm Clark of New Zealand's National Institute of Water and Atmospheric Research.

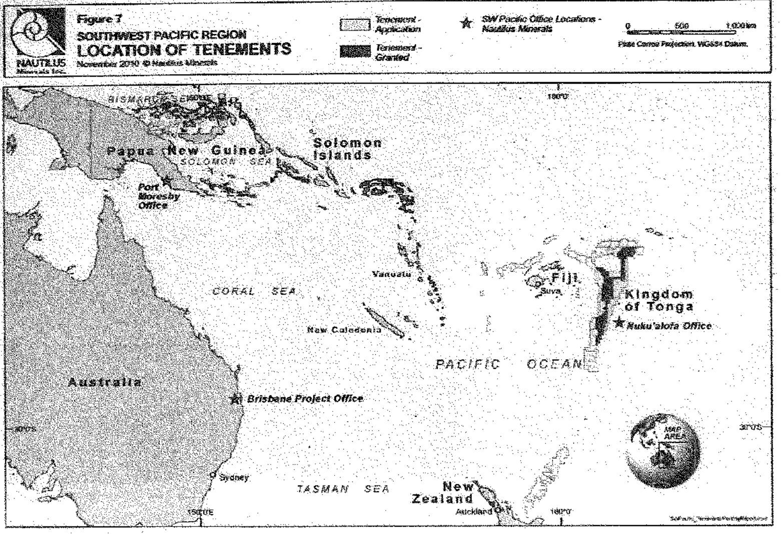
This, they said, was enough cobalt to supply the then global demand for the next 520 years.

According to information in the Madang Guidelines, a publication that resulted from a regional Mineral Policy workshop in Madang, Papua New Guinea, in 1999, the feasibility study had proposed a mining scenario with an output of about 3000 tonnes of cobalt per year, the equivalent of around 10 percent of the world's cobalt consumption that would be mined from a small area north of Aitutaki.

"The proposed mining area was chosen for its high nodule abundance, high cobalt content of the nodules and the presence of a relatively flat terrain that would facilitate the harvesting of the nodules. The nodules would be gathered by dredging, using small beam trawlers especially modified for the recovery of nodules.

"Once brought to the surface, the nodules would be loaded onto large transport vessels for shipment to a processing plant (assumed to be in New Zealand) where the nodules would be off-loaded, stockpiled and later reclaimed for smelting and refining at the plant."

Also in the 1990s, sea floor exploration done in the Cooks by US



engineering firm Bechtel had delivered promising results, enough for it to form the view that commercial mining of the nodules was economically, technically and environmentally feasible, where returns on investment were generous at over 20 percent, pegged at a cobalt price of US$25 a pound and a mining project lifetime of 26 years.

The world experienced a surge in cobalt price in 2007 to 2008, where it was trading at US$50 a pound on world metal markets, driven by a rise in the manufacture of what's known as "super alloys" that are mainly used in aircraft manufacturing.

Cobalt prices have since dropped and in May this year had traded at around US$16 per pound on the London Metals Exchange.

However, cobalt's use in rechargeable batteries for cell phones and hybrid-electric motor vehicles is an area of growth for it.

Professor Charles Fisher (right)...has spent years studying life found around deep sea hydrothermal vents and hydrocarbon seeps. *Photo: SOPAC*

That prospect and the huge leaps made since the 1990s in seabed mining technologies may soon see the end of New Caledonia as the only cobalt producing country in the Pacific.

Cook Islands, a country with virtually nil mining activity if extractions of gravel and sand are not counted, is now the first in the Pacific to put in place seabed mining legislations and policy. That's a significant move.

Seabed exploration has been going on in the Cooks for decades by the Russians, Japanese and Americans, yet, governments of the day have felt little need to put in place relevant laws, even after the Bechtel project findings.

Now, exploration has become commercially driven, according to Tap Pryor, the former co-director of the Bechtel project, and the Cook Islands is unsurprisingly already the focus of private companies and governments engaged in this field.

Canada's Endeavour Financial Corporation, a merchant bank with interest in mining, reportedly wants its manganese nodules, as well as the Korea Ocean Research and Development Institute (KORDI), no stranger to the Pacific's seabed.

But Cook Islands isn't the only exploitable small islands state. Manganese nodules, typically rich in manganese and iron oxides, are known to also occur in EEZs of Kiribati, Tuvalu and Niue, according to information provided by the Secretariat of the Pacific Community's Applied Geoscience and Technology Division (SOPAC).

They too are said to be closely following developments and may soon be forced to follow Cook Islands' lead in enacting relevant laws to cater for a rising commercial non-fishing interest in their EEZs.

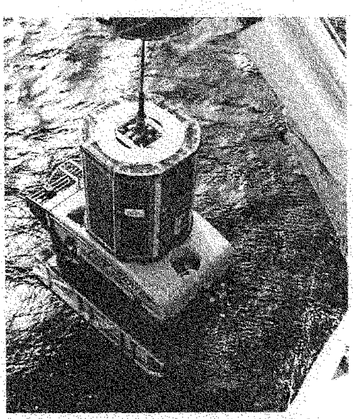
State of play

Kiribati's Foreign Investment Commission is considering an application for an exploration and mining license, a senior government official there told Islands Business. "But there's a lot of ground work to do first because Kiribati has no legislation to facilitate deep sea mining."

Governments in the region naturally think of seabed mining as an ocean of opportunities, now that its economic viability has been underscored by the growing interest from overseas mining companies, in particular, the Toronto-listed Nautilus Minerals. This is a possible new industry for most countries with spillover benefits in employment, tax revenue and community development, not to mention an increased knowledge of what's really there in their seabed.

Nautilus, as a pioneer seabed miner with over 154,000 sq km of granted tenements and applications for more in Papua New Guinea, Tonga, Solomon Islands, Fiji, Vanuatu and New Zealand, is already actively contributing to local communities through youth programmes and financial support to scientific studies, health and skills building in PNG and Tonga.

Through Nautilus too, PNG now knows more about its offshore minerals than it ever did before.



Launching the remote operated vehicle (ROV)...to explore the deep sea.
Photo: Nautilus

These involvements are being closely watched by governments in the Pacific and there is support and interest to encourage the development of seabed mining in the region.

Yet, it is not without resistance, in particular, from environmental groups and those representing indigenous Pacific islanders. They see its advancement as a new threat that adds to existing issues in environmental preservation especially that of the sea, and the not uncommon cry by native custodians over losing what they feel is rightly theirs and should be compensated for.

While Cook Islands is an example of a non-mining Pacific country sitting on huge mineral resources that may be worth more than its fish, the interest in the Pacific is extensive. Two countries for a start have sponsored applications by private companies to the International Seabed Authority in 2008 to explore international waters, areas of the ocean that do not fall in any national jurisdiction.

Nauru sponsored Nauru Ocean Resources Incorporated (NORI), a subsidiary of Nautilus, while Tonga was also engaged in a similar deal with Tonga Offshore Mining Ltd, also a Nautilus subsidiary.

And almost every island country is either processing seabed minerals exploration and/or mining licenses or has already issued some.

The Solomon Islands, according to its Director of Mines Peter Auga, has just issued 90 offshore exploration licenses to two companies—Nautilus and Australian-owned Bluewater Metals. Bluewater Metals, according to SOPAC, has also been granted licenses in Vanuatu, PNG and Tonga.

PNG, known as the mining capital of the region, has a heavy Nautilus presence in its waters and has just issued it with the world's first commercial seabed mining license for the now famous Solwara 1 project, located in the Bismarck Sea between East New Britain and New Ireland provinces—with mining to begin by the end of 2013.

KORDI—which has been doing scientific studies on seabed mineralisation and ecosystems in PNG and Fiji waters in the last ten years—now has exploration licenses in Fiji and Tonga, and is also interested in the Cook Islands

In fact, available data at SOPAC, based on previous studies done in the region, reveal sea mineralisation occurring throughout the EEZs of most Pacific countries, from as far north as Marshall Islands and the Federated States of Micronesia to Kiribati, Tuvalu, towards the centre to Fiji, Solomon Islands, Vanuatu, right down to the Cook Islands, Samoa and Niue.

This may tickle governments but environmental lobbyists are wary of it. Unlike land-based mining, much about the environmental impact of seabed mining is not well understood. Scientists themselves admit there's a lot of "unknown" about how its ramifications would impact upon the ecosystems in that part of the ocean depths of over 1000 metres where mining is likely to happen.

Fragile Ocean

"The oceans for us Pacific islanders is what joins us, feeds us and sustains us. Every second breath we take comes from the oceans so when scientists warn that our knowledge of sea life on the sea floor around our oceans is very limited, it is immediately a warning for caution," said Greenpeace Pacific political advisor Seni Nabou.

"The Pacific Ocean compared to other oceans in the world is relatively healthy. With climate change threatening our islands, illegal, unreported unregulated (IUU) fishing and overfishing tearing into our economies and now deep sea mining, the Pacific needs to set up insurance mechanisms such as marine reserves where all extractive uses such as seabed mining and fishing are prohibited and other disturbances minimised. The lure of wealth such as what is being promised with deep sea mining will have a cost.

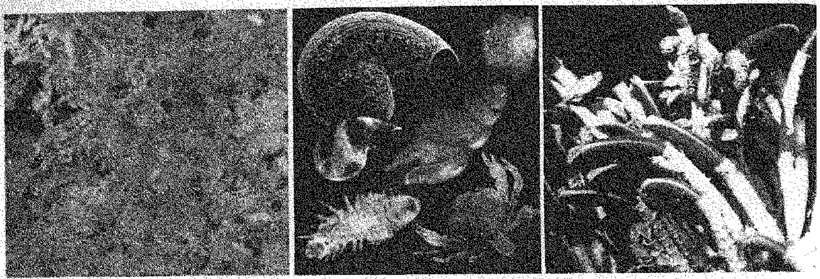
"The Pacific can lead the way by finding a way to embrace development without environmental destruction," Nabou added.

Greenpeace, concerned that land-based mining pollution and environmental degradation may be duplicated in the sea via seabed mining, is advocating the precautionary principle.

"Not knowing what can or would be damaged should be an automatic response for us to hold back until we do know exactly what we can or will lose, and most importantly, all Pacific citizens of states or territories where deep sea mining or exploration is happening, should have the final say on whether their country should take that risk or not—not government officials, not politicians and definitely not mining companies. There is an abundance of deep-sea life and vulnerable marine ecosystems that work in symbiosis with other marine life, the knowledge and relationships of which we have not even begun to understand," Nabou added.

The view is shared by other NGOs. The Fiji-based Pacific Network on Globalisation (PANG) and the PNG-based activist group ActNow! recently issue a joint statement denouncing the encouragement of seabed mining.

"It is being progressed by minority interest groups—mining companies and unfortunately supported by few ministries in national



Life in the deep...some of the life-forms found around hydrothermal vents are unique and valued by science. Giant tubeworms (right). ***Photo: oceanexplorer.noaa.gov***

governments and SOPAC, who are sold on the 'potential economic gains" in the absence of clear scientific evidence about the likely environmental, economic and social consequences," said PANG coordinator, Maureen Penjueli.

In Papua New Guinea, landowners fear seabed mining and its impact on their fishing grounds.

"Landholders are concerned about the whole mining process. What will happen to the seabed environment when it is dug up? What will happen to the fish and other organisms that live there? What will be the knock-on effect on the marine food chain? Where will the ores be processed? What will happen to the toxic tailings?

"There are so many questions, yet, landholders have been shown no independent scientific evidence that provides the answers to any of these questions. So they have no confidence in the mining company nor the government," Penjueli added.

Unique marine life

Perhaps science itself is yet unable to give the world answers to those questions because the word from scientists is that relatively little studies have been carried out on the sea floor as it is an expensive exercise and technologies were simply not available to allow for the kind of observation of life in the deep that is possible these days.

However, the little that science does know is that biodiversity in the potential mine site—this being a hydrothermal vent, one of the three known hosts of seabed mineralisation—is very high and that life-forms found around these vents are unique and valued by science.

Giant tubeworms with special blood that carry oxygen in the presence of sulfide and not get poisoned as other species of life would; bacteria that manufacture their own food; and scale worms that thrive in extremely high temperature; are just a few of the many peculiarities near hydrothermal vents that are not found in any other parts of the ocean.

"Hydrothermal vents is a very extreme environment, so organisms that live there have adapted to very different conditions, from high temperatures (up to 350 degrees Celsius), toxic chemicals, heavy metals. And because they have lived there, they have special metabolism and it's very possible that we will find some of the tricks these animals use to be important medically, pharmaceutically and biotechnologically.

"We've already found some but I think there may be more," said Professor Charles 'Chuck' Fisher, a biologist at Pennsylvania State University in the United States.

Fisher has spent years studying life found around deep sea hydrothermal vents and hydrocarbon seeps.

"Most life you find at the vents have relatives in other parts of the ocean so, we find fish, but they're different fish, we find snails but they're different snails; you do find sponges but they're different sponges. Sometimes, life is very different like those giant tubeworms, there's nothing like that anywhere else in the ocean. But the species near the vents are mostly all unique," Fisher said.

For deeply passionate environmentalists, seabed mining is going to be a horror story because there is a general view that in order for it to happen, some ecosystems in these hydrothermal vents will have to be sacrificed.

"When hot water comes from deep within the earth's crust, that hot water is full of minerals and heavy metals come out through the hydrothermal vents and get deposited there. So after thousands of years, they are rich deposits of copper, gold, silver and other metals that fill up in these vents, where these animals also live. That's why these miners are interested in going there. It's very possible that they can extract that ore and now very recently, it has become possible for them to do it at that great depth. Economically, it's viable. But when it comes to environmental concerns, it depends on where we're mining," said Fisher.

'We must take these concerns one at a time as they're different in different countries and in different waters. At hydrothermal vents, I think if we go forward very carefully, slowly, use the science that we know, there is potential we can mine those places and not drive animals extinct. Now, where mining occurs in those small areas, it will kill all animals in those areas, just like a mine on land in a small area will kill all trees and plants.

"But if you do it carefully, intelligently, we limit ourselves to strategic small areas, I think we can go forward. There will be impacts but it's a risk that we can manage."

Mitigation strategies planned by Nautilus, the world's first commercial deep sea miner, include the creation of an unmined reference area, a temporary refuge area within Solwara 1, relocation of animals and recolonisation of areas where excavation is complete.

Fisher however has doubts about this. "I personally think that human-induced restoration of vents is going to be very difficult and might not even be possible. I think the best environmental approach is to protect some areas and realise that we will lose some.

"Maybe restoration will work, maybe it's possible, but I think it's better to assume that it will not work and make other plans to preserve the species.

"We will lose individual animals but if we do this right, we can save the species and save the population. It's just like the mine on land, you'll lose some individual trees and bushes and animals that live there but if it's done right, you can save the species."

Coexistence?

So what then of the Pacific's lucrative tuna industry, can it coexist with seabed mining or will it be collateral damage too? What's coming out of PNG are concerns by coastal dwellers that the Solwara 1 project would damage the breeding ground of their fish and so the project is being perceived as a danger to food supply in these areas. There's no scientific evidence yet to back that but if governments in the region have expressed worry over the impact on fish stock in their waters, these concerns have not surfaced or discussed at regional organisations representing their fishing interests.

The dilemma here is that it is still a very new frontier for everyone. "I am not an expert on the issue and don't know whether seabed mining involves drilling or dredging," said Dr Transform Aqorau, director of the Parties to the Nauru Agreement (PNA) secretariat in Majuro, Marshall Islands.

"I do know that bottom trawling which involves running a deep net on the ocean floor to scoop up fish is quite destructive because it damages the ecosystem in the process. It is not a fishery that is developed in this part of the world because generally it occurs along continental shelves and we don't have too many of those in the region and Palau has been working through the (Pacific Islands Forum Fisheries Agency) to have bottom trawling banned from the region. But I don't have enough knowledge of seabed mining, its scope, size and nature to know what the impacts are in this part of the world," Aqorau said.

"Maybe we could learn from the oil rig platforms in the Northern Atlantic and the Mexican Gulf, and the lesson there is you can't really be sure until something drastic happens."

PNA members are Federated States of Micronesia, Kiribati, Marshall Islands, Nauru, Palau, PNG, Solomon Islands and Tuvalu. Some 25 percent of the world's tuna supply is caught in their waters. Some of them are also locations for seabed mineral exploration.

"The ocean is a hugely vast area and I guess you need to look at what has happened in the North Pacific and Gulf of Mexico and other places where they have oil rigs, which is considered 'seabed mining' to see that the two –fisheries and seabed mining—have coexisted," Aqorau said.

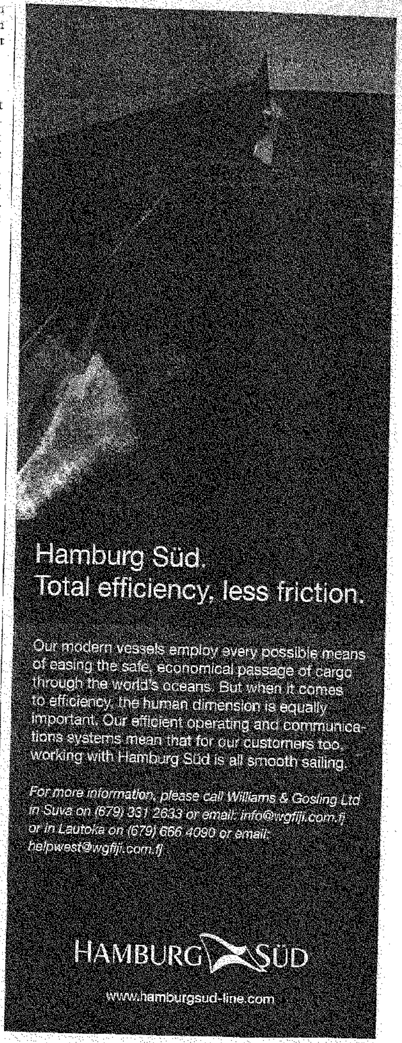
Despite the surge of interest and prospects of riches that surround seabed mining in the region, fishing to some will still be king in the Pacific Ocean.

"It's not an activity that will suddenly increase overnight because SOPAC has developed a draft seabed mining legislation, so I think it should be made clear to Pacific governments that you are not going to get a hive and plethora of activities at your doorsteps.

"Seabed mining is a high risk and expensive investment and will only be done if the net returns are worth the investments, and only if it is cheaper and more viable to extract those same minerals from the seabed rather than land," said Aqorau.

"Having said that, I think it is a fact that what lies underneath the deep blue ocean is relatively unknown. There are known minerals lurking beneath the ocean's seabed, which if proven viable, will be mined if the need arises.

"It has been well known for a long time now that there are manganese nodules in the Cook Islands and also in Tonga but it has been expensive to invest in mining them. Plus, the world's needs of materials made from manganese nodules are still being provided from land-based sources, so when it happens, it will happen but don't start making people excited because I first heard about manganese nodules in 1998!" IB



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